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THE ARCTIC EXPEDITION.

IX.

The Work.

The examination of the vast unknown region around the Northern Pole is an object of great and increasing scientific importance; while the Arctic Expeditions which have been employed on this service have ever been popular in the navy, and have supplied a field of exertion which has been conducive to the best interests of the profession. Feeling this very strongly, all true friends of the navy and of maritime enterprise saw with regret the total abandonment of Arctic work by the Government of this country, after the return of Belcher's Expedition in 1854. Sherard Osborn advocated the renewal of Arctic research perseveringly, patiently, and with such cogent and unanswerable arguments, that, little by little, his views gained ground. First opposition became feebler, then unanimity was secured among Arctic authorities, and at length, after ten years of untiring advocacy, Osborn had the happiness, a few months before his lamented death, of seeing the views which could barely get a hearing in 1865, adopted first by the press, and finally by the Government, and the country.

But with popularity came new dangers, including the partial diversion of the objects of the expedition from scientific research within the unknown area to a foolish and fanciful quest for the North Pole. Geographers will in future, it is to be hoped, keep the true aims of exploration in view, in the further advocacy of the prosecution and eventual completion of discovery within the unknown area.

The problem before Sherard Osborn was the selection of the best route by which the unknown area might be approached and explored. It was clear that the great work could only be completed by several successive expeditions approaching the region to be examined by different routes; and, in the first instance, the point was to decide upon the best route by which the first expedition that would be equipped, after the renewal of Arctic research had been decided upon, could enter the unknown region, and reach a point whence the largest amount of useful work could be done with the means at its disposal.

For reasons which have already been fully explained in this journal, on more than one occasion, Sherard Osborn selected the Smith Sound route; and, after the matter had been put before the public and the Government in every form and shape for ten years, the Arctic Expedition was at length decided upon, and the Smith Sound route was chosen as the scene of its labours.

The work of the Arctic Expedition was to advance a ship across the threshold of the unknown region beyond the channels leading from Smith Sound, and then to explore the newly discovered sea and coast lines to the utmost extent that was possible with the means supplied to it. How admirably its leader succeeded in the first and most important part of the service, by establishing his ship in winter-quarters within the unknown region, and how thoroughly his officers performed the work of sledge exploration, is now known through the publication of the Report of Captain Nares. Fuller details are of course anxiously expected by all lovers of enterprise, and by all who are interested in scientific research.

Meanwhile it seems opportune to discuss the position which the Nares Expedition will henceforth take in history, with reference to similar voyages of discovery within the Arctic circle.

First let us establish the grounds upon which any Arctic Expedition ought to be pronounced a success or a failure. In the present century the nominal objects of these expeditions have usually been to make the North-west Passage, or to stand on a particular imaginary spot on the earth's surface; and as neither of these objects have ever been attained, no expedition, if judged on such absurd grounds, has ever been successful. If, however, the expeditions are judged by their results, very few can be called failures, and the great majority have achieved a fair measure of success. Nearly all have advanced our geographical knowledge beyond the previous stand-point. The true objects of Parry's voyages were to survey, to observe for the variation and inclination of the magnetic needle and the intensity of magnetic force, the effect of the aurora on the electrometer, the phenomena of refraction, tides and currents, meteorology, and to make collections in natural history. With him success was secure if he could advance his ship into an unknown region where no ship had been before. Thus Parry's first voyage must be looked upon as a great and complete success. On the same principle his third voyage was a failure; but when success is so difficult, and the attempt to secure it calls forth such noble qualities, the English nation was and is as proud of the failures of such men as Parry and Back as of the greatest successes.

The success of an Arctic Expedition is secured by the establishment of a ship in winter-quarters in a position within the unknown region; and the character

of the success must be measured by the difficulties overcome. Tested by this standard, which is the only true one, the expedition of Captain Nares takes very high rank. Those which have pushed westward from Lancaster Sound have succeeded by taking advantage of lanes of water in ice neither more nor less formidable than that met with by the whalers in Baffin's Bay. Of former navigators, McClure alone has grappled with and overcome the obstacles presented by such ice as Captain Nares had to encounter; and it is the special character of the navigation in the channels leading from Smith Sound which enhances the merit of having forced a passage through them.

It was at 8 P.M. on the 29th of July, 1875, that the two vessels under the command of Captain Nares sighted the first ice, when 15 miles north of Cape Isabella; and from that day until the 1st of September there was an almost continuous struggle, in which consummate seamanship, patience, rapid decision, great knowledge of the effect of tides, winds, and currents, and untiring energy, grappled with and overcame obstacles such as no previous expedition has successfully encountered. Captain Nares, in his Report, notices the deceptive impressions inexperienced people naturally receive when, from a lofty look-out station, they observe a sea unbordered by ice. From Littleton Island the inexperienced observer would have concluded that there was an open Polar Sea; at Cape Sabine, only 25 miles distant, he would as certainly have concluded that his farther progress was for ever stayed. Captain Nares was deceived by neither of these appearances. For three days he watched for an opening, and at length, although the main pack remained impenetrable to the northward, it moved from the land, and he succeeded in rounding Cape Sabine and entering Hayes Sound. He then discerned a clear space of water along the shore of the main land to the northward, and ran the two ships into the pack with the hope of forcing a way through. For boldness and audacity are needed as well as patience in this most difficult navigation; and the great gift of all is to know when the one virtue should be practised and when the other. For the next twenty-four hours there was a constant struggle through the pack towards the shore. Beyond Cape Frazer the nature of the pack changed, the floes consisting of old hummocky pieces of great age pressed together, and from 12 to 20 feet thick, and upwards. The constant movement of these heavy floes, nipping together with great force, like the closing of a gigantic pair of shears—as Captain Nares describes it—placed the ships in great danger. If once nipped by such ice they would have been instantly crushed. On the 19th of August the ships had reached Cape Frazer, and Captain Nares boldly, but judiciously, bored his way into the pack for 2 miles, and so reached a lane of water which led round the Cape, and enabled him to enter Kennedy Channel.

On August 21st a passage was forced through 3 miles of close heavy floe-pieces, and the ships entered open lanes of water which enabled them to traverse the length of Kennedy Channel and reach Bessel's Bay. On the 24th they crossed the channel under steam, and came to in a well-protected harbour at the entrance of Lady Franklin Bay, in 81° 44′ N., which was selected as the winter-quarters of the 'Discovery.'

On the morning of the 26th the two ships parted company. The pack, which had been moving southward all day, drifted slightly off the land, and Captain Nares took instant advantage of the opening, but in a tussle with a heavy floe-piece off Cape Beechey the 'Alert's' rudder was seriously injured. The pack, at the same time, pressed tight in upon the Cape, so the ship was secured inside some grounded ice, and the rudder was shifted.

The 'Alert' then reached Lincoln Bay, where she was completely beset by a very heavy pack consisting of ice 80 feet thick. The first ice of this formidable character had been seen, in detached pieces, near Cape Frazer. Getting up full steam, a water space was formed by advancing and retreating, and eventually the pack was providentially cleared, and the shore reached again in Lincoln Bay. Then the wind freshened from the S.W., and on the 1st of September the 'Alert' passed up Robeson Channel, in a lane of water between the land and the pack, running at the rate of 9½ knots an hour before a strong gale. At noon the gallant ship was in 82° 24′ N., the highest latitude ever reached by any vessel of any nation, and the white ensign was hoisted at the peak. On hauling to the westward, at the north entrance of Robeson Channel, they lost the wind, and were obliged to proceed under steam, and off Cape Sheridan the lane of water ended and the ice again touched the shore.

On leaving Robeson Channel the land, which had previously consisted of precipitous cliffs, loses its steep character, and the heavy ice is stranded at a distance of 100 to 200 yards from the shore, forming a fringe of detached masses of ice rising from 20 to 60 feet above the water, and lying aground in from 8 to 12 fathoms. These are merely pieces of the frozen sea, broken off; the floe-ice averaging a thickness of 80 feet. Thus the Polar Ocean was discovered to be exactly the opposite of an "open sea." Captain Nares now realised the fact that he had entered that same Sea of Ancient Ice which Collinson and McClure had seen off the coast of America and Banks Island.

The main test of success may now be applied. Nares had advanced his ship further north than any keel had ever floated, had crossed the threshold of the unknown region, and had established her in winter-quarters on the shores of a previously unknown land, facing an unknown sea, in latitude 82° 27′ N. The expedition by this achievement alone secured success, and secured it in the face of greater and more prolonged difficulties and dangers than had ever before been grappled with and overcome by any former expedition, with the single exception of the 'Investigator.'

But the introduction of sledge-travelling into the programme of Arctic exploration by Sir Leopold McClintock, after serving with Sir James Ross in 1848-49, indefinitely increased the power of explorers to effect their objects. Hence there can be no comparison between the work of English naval Arctic Expeditions previous to and after the year 1850. The work of the latter only commenced where that of the former ended.

The new system of Arctic exploration was fully inaugurated by Captain Austin, in 1850-51, with the aid of McClintock. Very good work was also done by Captains Collinson and McClure, but they did not

make use of the depôt system and of auxiliary sledges to the same extent. For practical purposes, therefore, Austin's Expedition was the founder of Arctic sledge-travelling in its present form; and in 1852-54 the distinguished officers who served under Captain Austin, namely McClintock, Osborn, Mecham, and Hamilton developed it, and brought it to perfection. The further and more complete success of the Nares Expedition would be secured if, using the ship as a point of departure, the officers continued the exploration of the surrounding region to the greatest extent possible with the means at their disposal. Whether this was done can be decided by a comparison between the work of the respective expeditions, bearing in mind the very great differences in the circumstances. It will be found that, while all did their work admirably, the younger generation in no one way falls short of the preceding one, as regards ability, endurance, pluck, or stubborn determination. These qualities were assuredly required in a high degree, and they were most assuredly forthcoming.

The sledging work may be divided into three sections, as regards the periods during which the operations are carried on. First, there is the autumn travelling, when depôts are laid out as far in advance as possible, in readiness for the spring sledges. Secondly, there are the short trips in the very early spring undertaken for some special service. Thirdly, there is the main work of all in the spring, performed by the extended parties with their auxiliaries.

The autumn travelling is the most severe and miserable work, entailing the greatest amount of hardship and danger. It was first set on foot by Captain Austin in the autumn of 1850, as a tentative measure. McClintock went away for seven days, from October 2nd to 9th, experiencing a temperature of $-8°$; Robert Aldrich from October 2nd to 6th, and Sherard Osborn from October 10th to 12th, with a temperature of $-3°$. In 1852 the autumn travelling was further developed in the 'Resolute,' at Melville Island. On that occasion McClintock was away for eighteen days from September 14th to October 2nd, and again for twenty-two days, from October 3rd to 25th. Mecham, Nares, Hamilton, and Pim left the ship on September 22nd, and were absent twenty-two, twenty-three, sixteen, and eighteen days respectively. Thus Captain Nares had been away longer, in autumn travelling, than any other Arctic officer. McClintock registered $-21°$, but the temperature was generally above zero. In 1854, Sherard Osborn was away from September 11th to 22nd. The misery of autumn travelling consists in the weak ice and the danger of falling through, the snow-fall, and the damp cold with increasing darkness.

The 'Alert' commenced her autumn travelling on the 9th of September, when Lieutenant Aldrich started; and on the 11th Captain Markham set out, with Lieutenants Parr and Egerton and seventeen men, to advance two ice-boats to the northward, when the temperature was $+14°$. The boats were taken to a distance of 18 miles from the ship, but the travelling was most difficult and irksome, the snow being very deep. The men worked splendidly, never complaining, always cheerful; the harder the work the more mirth and merriment. On the 14th there was a furious gale of wind from the S.W. and the floe began to break up. They had barely time to strike tents, pack sledges and move on, and five minutes afterwards the piece of ice on which they had been was at sea. If they had not observed it breaking up in time, nothing could have saved them from destruction. The gale increased almost to a hurricane, and the men, though working splendidly, were getting weary, but there was no lee under which they could encamp. The wind, being right ahead, beat mercilessly into their faces, and pebbles were blown along by its force and driven against their faces, causing sharp pain. It would clearly have been impossible to pitch a tent, and one of the men fell from exhaustion, was growing delirious, and had to be put on the sledge. Captain Markham at last set out for the ship to procure assistance, and arrived on the beach opposite to her late at night. The snow-drift was so dense that, although barely a hundred yards off, he could only get occasional glimpses of the ship; and it was long before a boat could communicate. At length aid was sent out, and the exhausted party arrived on board after an absence of four days.

This was a fair commencement, but the real work of the autumn travelling had not yet begun. On the 22nd of September Lieutenant Aldrich started with two dog-sledges as a pioneer, and on the 25th the main party left the ship under the command of Captain Markham, with whom were Lieutenants Parr and May, and three eight-men sledges, the MARCO POLO, VICTORY, and HERCULES. The temperature was $+1°$ when the crews took up their stations alongside their respective sledges, and the standards of the three officers were displayed. The young ice seemed strong enough to bear at first, but about a mile from the ship Parr's sledge, the VICTORY, went through, and it was a quarter of an hour before it could be dragged on a firm piece of ice again. Two miles further on the MARCO POLO also went through, and the tent was saturated. It now became necessary to stick to the ice foot, and follow round all the indentations of the coast, which materially increased the distance. The temperature fell to $-3°$ towards evening, and the wet tent was frozen hard. On the first day the distance made good was 12 miles. The parties averaged from 10 to 12 miles a day made good during the absence of twenty days, and occasionally they marched as much as 13 and 14 miles. The ancient floes were covered with blue-topped hummocks, which were as smooth as glass, making it extremely difficult to maintain a footing, and very hard work for the men to drag.

The blinding snow-storms, the treacherous ice, the deep snow, the necessity for portages across the land, the sudden changes of temperature, and the rapidly increasing darkness, rendered this a most trying journey. But they pressed onwards, established a large depôt 50 miles from the ship, and crossed the parallel of 82° 45′ N., the highest latitude hitherto attained by man. In this Lieutenant Aldrich had preceded them with the dog sledges. The temperature fell to $-35°$, and the sun had entirely disappeared four days before they returned to the ship on the 15th of October, after an absence of twenty days.

In comparing the autumn travelling of the 'Alert' with that of the 'Assistance' or 'Resolute,' the difference of latitude must be taken into consideration. The sun did not leave the 'Resolute' until the 3rd of November, while it was last seen from the 'Alert' on the 11th of October. Consequently the cold and

darkness experienced by the 'Alert's' party in October is equivalent to that which a party from the 'Resolute' would have had in November, and no party from the 'Resolute' was away in that month, the last returning on the 25th of October. Hence, the autumn travelling of the 'Alert' has eclipsed all that had ever been done previously, whether we consider the work accomplished, the hardships endured, or the cold and misery experienced. Unfortunately this brilliant piece of work had to be heavily paid for. Half the men returned badly frost-bitten, and three suffered amputation, including one of the most valuable officers in the ship.

An Arctic winter may be looked upon as a period of preparation for the spring travelling. It was to Captain Austin, who commanded the search expedition of 1850-51, that the credit is due of having brought the carefully calculated system for winter-quarters to the highest perfection, and no one has since improved upon his arrangements. He had himself served under Parry in his third voyage, and was deeply impressed with the importance of preserving the health and spirits of the people during the prolonged absence of the sun. If the ships of Captain Austin's expedition were hitherto the happiest and jolliest and most united that ever wintered in the Arctic regions, the 'Alert' and 'Discovery' were equal to them, in all those respects. In the 'Alert' the men were kept employed and amused while discipline was preserved. Thus the long darkness, the longest that human beings ever faced, was passed through without deterioration, and when the sun returned every soul was found apparently as full of life and energy, and as strong and healthy as when it took its departure. The sun was absent from October the 11th to February the 29th, a period of 142 days.

The second period of sledge-travelling embraces the time when occasional remarkable trips have been undertaken, for special reasons, during the intense cold of the very early spring.

Captain Kennedy made a journey from Batty Bay to Fury Beach as early as February in the year 1852, accompanied by Lieutenant Bellot of the French Navy. In 1853 Lieutenant Pim and Dr. Domville were despatched from the 'Resolute' on the 10th of March, 1853, in order to communicate with Captain McClure in the Bay of Mercy. The distance was 180 miles, and it occupied Lieutenant Pim twenty-eight days, but the temperature never fell below − 14°. Captain McClure left the 'Investigator' on the day after Lieutenant Pim arrived, and performed the same journey in twelve days. Richards and Osborn, with six sledges, left the 'Assistance' on March 22nd, 1853, crossed Queen's Channel to establish a depôt, and returned on March 29th, the temperature not falling lower than − 8°. But Commander Richards, with Mr. Herbert, undertook a most severe journey in February 1854. They left the 'Assistance' on the 22nd, reaching the 'North Star' on the 28th, a period of seven days, during which the temperature was from — 32° to — 42°. Commander Richards reported that the men got no rest owing to the intense cold, and that they could not have endured it, even in fine weather, for many days. On March 7th, 1854, Hamilton and Nares left the 'Resolute' in extreme cold, the thermometer falling as low as — 44°. May left the 'Assistance' for the 'North Star' a few days earlier, and Richards left the 'North Star' for the 'Resolute' on March 16th, with the temperature at — 23°. McClintock and Allen Young were travelling from February 15th to March 3rd, 1859, with the temperature from — 40° to — 48°, and Allen Young was away again from March 18th to 28th. Finally, Lieutenant Payer, of the 'Tegetthoff,' experienced a temperature of — 58° during an absence from his ship from March 12th to 20th, 1874.

These are the most remarkable Arctic journeys on record, undertaken for short periods during intense cold. In comparing them with a similar trip made from the 'Alert' to the 'Discovery,' the difference in latitude must again be taken into consideration. Where the 'Resolute' wintered the sun returned on February 5th, while with the 'Alert' it was absent until February 29th. So that the February of the Arctic regions from 70° to 80° N., may be looked upon as the March of the Polar regions north of 80°.

On the 12th of March, 1876, with the temperature at — 35°, Lieutenants Egerton and Rawson, accompanied by Petersen the Danish dog-driver, left the 'Alert' with the dog-sledge in order to open communication with the 'Discovery.'

Four days afterwards, during which the temperature had fallen to — 50°, the party returned, owing to the severe illness of Petersen. He was taken ill with cramp in the stomach, and afterwards nothing could keep him warm. The two officers burrowed out a snow-hut, and succeeded in raising the temperature inside to + 7°. They then deprived themselves of all their own warm clothing, and, at the expense of the heat of their own bodies, they succeeded, after great persistence, in restoring the circulation in his extremities. During the journey back Egerton and Rawson behaved most heroically, and, although frequently badly frost-bitten themselves, they succeeded in keeping life in the invalid until they arrived on board. Both the poor fellow's feet had to be amputated, and he died of exhaustion about three months afterwards.

On March 20th, Egerton and Rawson again started with the temperature 30° below zero, and reached the 'Discovery' in six days, after a hard scramble over the ice in Robeson Channel, and along the steep snow-slopes formed at the foot of the precipitous coast cliffs, the temperature falling to — 42°. In the same severe cold they returned to the 'Alert' on April 4th.

All Arctic officers will agree that these remarkable journeys of Egerton and Rawson take rank with anything of the kind that had been done by their predecessors; and the gallant young explorers have thus nobly upheld the credit of the expedition as regards this second period of sledge-travelling.

But the great work, for which these autumn and early spring trips were only preparations, was that of the extended and auxiliary parties during April, May, and June.

The system of extended parties and auxiliaries was inaugurated by Captain Austin in 1851. He had a force of 180 men, which enabled him to despatch no less than six extended parties to be away sixty days, or more if game was procured, each supported by an auxiliary sledge to lay out a depôt. There were two divisions of three extended parties each; that to the south commanded by Captain Ommanney, with Sherard Osborn and Browne; that to the west led by McClintock, Robert Aldrich, and Bradford. They

started on April 15th, with the temperature at +30°; after the first week there was a sudden fall, and some of the sledges registered as low as — 36°, but this cold only lasted a few days, and during May the travelling became very pleasant. Ommanney was away sixty days, during ten of which he was detained in his tent by the wind, and he marched over 480 miles. Osborn was absent fifty-eight, and Browne forty-three days. In the western division Aldrich was away sixty-two, McClintock and Bradford eighty-three days. McClintock was able to prolong his journey, which at that time was by far the most remarkable on record, owing to having shot three musk oxen, two bears, and a reindeer. The other parties got no game. The depôt parties were away from twenty to thirty days. The ice was for the most part smooth, with occasional ridges of hummocks, and a rate of 10 miles a day was easily maintained.

McClintock, Mecham, and Hamilton brought the traditions of Austin's Expedition with them in the 'Resolute' and 'Intrepid,' when they wintered at Melville Island in 1852-53. There was a force of ninety men, and it was arranged that, by a system of depôts, two extended parties, led by McClintock and Mecham, should be provisioned for ninety days, inclusive of the autumn depôts. The travelling parties left the ship on the 4th of April, when the thermometer was 1° above zero. McClintock shot game which yielded him 1629 lbs. of fresh meat, and was enabled to prolong his absence for 105 days, during which he attained a distance of 229 miles from the ship. The number of miles travelled over was 1328. He had ten men and two sledges, one a small light satellite, by means of which he was enabled to extend the amount of coast line examined. He returned on board on July 18th. His lowest temperature was — 34°. Mecham was away ninety-four days, and travelled over 1163 miles. He also had a satellite sledge. He shot game which yielded him 1275 lbs. of fresh meat. Hamilton was away fifty-five days, and travelled 675 miles, at the rate of 12 miles a day. He obtained 126 lbs. of fresh meat. The auxiliary parties were away from forty to fifty days, the best work being done by Nares, De Bray, and Roche. The latter made a remarkable dog-sledge journey to Beechey Island, going over 590 miles in thirty-nine days.

From the 'Assistance,' in the same year, 1853, two extended parties were led to Melville Island by Richards and Sherard Osborn. They left the ship on April 10th, with a temperature of — 5°, and during three days experienced a temperature of — 20°. Richards reached the 'Resolute' in fifty-six days, where he rested for three days, and his return journey took him thirty days. In the two journeys he went over 840 miles. Osborn was away from the ship for ninety-seven days, but he was not travelling all the time. He, however, travelled over 935 miles. In the middle of June, having shot no game, he and one of his crew were attacked by scurvy. Fortunately he afterwards obtained three reindeer, yielding 300 lbs. of fresh meat, besides ducks and ptarmigan, and this checked the disease, which was almost entirely removed by an abundant issue of lime juice, when they reached the depôt at Lady Franklin Bay. Of the 'Assistance' auxiliary parties, W. W. May was absent sixty-four, Herbert forty-three, and Lyall twenty-three days.

The most brilliant feat in Arctic sledge-travelling was performed by Mecham in the spring of 1854. He left the 'Resolute' on April 3rd, and arrived at the Princess Royal Islands on the 4th of May, where he obtained intelligence of H.M S. 'Enterprise.' On the 17th he set out on the return journey to the 'North Star' at Beechey Island, and completed it on June 12th, after an absence of seventy days, during which he was travelling for sixty-one days. He went over 1336 statute miles, at an average rate of 20 miles a day. While away he obtained one reindeer, three hares, and thirty ptarmigan. Although the floes were for the most part smooth, the sledge light, and depôts were laid out at intervals, still, with all fair deductions, the marching was magnificent, and Mecham's journey of 1854 will probably be, for all time, the most memorable in Arctic annals.

The 'Enterprise' and 'Investigator' also did good work, under Collinson and McClure. Murray Parks, in his march to Melville Island, was away seventy-four days: and Captain Collinson himself made journeys of fifty-two and forty-nine days. Owing to the absence of the depôt system the 'Investigator' did not do so much, Haswell and the other explorers not being able to prolong their absence for more than forty-two days.

In the voyage of the 'Fox,' under McClintock, in 1859, the remarkable feature is the almost incessant travelling. We have already noticed their work in the early spring. Their extended parties started on the second of April, when the temperature was — 30°. McClintock himself was absent for ninety days, during which time he obtained two reindeer and other game. Hobson was absent seventy-two days, but suffered severely from scurvy. Allen Young set out on the 7th of April, and after thirty-eight days he sent back the men and tent owing to provisions running short. He then pressed onwards with one man and the dogs, sleeping each night in a hole in the snow. After an absence of sixty days he returned to the ship, took one day's rest, and then went away again to complete his exploring work for eighteen days, making in all a journey of seventy-eight days. He also suffered from scurvy.

Such is a *résumé* of the sledge-travelling work done by former Arctic Expeditions. It may be added here that the 'Resolute,' whose people performed the most remarkable journeys, was supplied with an enormous quantity of musk oxen, reindeer, and other game. In one year as much as 25,077 lbs. of fresh meat were issued on board and to the travelling parties, or 305 lbs. per man. The 'Investigator' obtained 10,167 lbs. of fresh meat, or 154 lbs. per man, which accounts for the scurvy not having made its appearance until the third winter.

In order to make a satisfactory comparison between the work of former Arctic sledge-travellers and that of the Nares Expedition, several differences in the circumstances must be borne in mind. In the first place the late expedition was much weaker as regards hands. In organising his sledging arrangements, Captain Austin had 180 men; the 'Resolute,' 'Assistance,' 'Intrepid,' and 'Pioneer,' in 1853, again had 180 men. But the 'Alert' and 'Discovery' together only had 120 men. Thus it was not possible

to have so many extended parties, nor to support them to the same extent with depôts. It must also be remembered that the greater length of the winter, and the more severe and more prolonged cold in the spring, as well as the infinitely heavier nature of the ice, were all against the Nares Expedition, as well as the total absence of game. So that, in comparing the work, it is necessary to take these differences into consideration, and not to judge merely by figures. It is also obviously right to take the number of working days as the test, and not the distances, as the latter, of course, depend entirely on the nature of the ice.

Having placed his ships in admirable positions, Captain Nares organised his parties with a view to making as thorough an exploration as the means at his disposal allowed, in every direction. If the coast had trended northwards he would probably have concentrated the whole of his force on an advance on that line. But as it was impossible to effect any great progress over the Palæocrystic Sea, he wisely determined to make the exploration as thorough as possible to north, west, east, and south. He therefore, decided upon despatching four extended parties, provisioned, including depôts, for periods of from sixty to eighty days; each extended party having its auxiliary sledge. The most hazardous attempt was to be made due north over the frozen sea, where there was the possibility of a disruption of the ice. It was, consequently, considered necessary that two sledge-crews, with Captain Markham in command, and Lieutenant Parr under his orders, should continue together the whole time, and that boats should be taken capable of receiving all the men and gear. Two auxiliary sledges, under Dr. Moss and Mr. White, were to accompany them to the point where they left the land. This was the northern division. The western division, under command of Lieutenant Pelham Aldrich was to explore the coast to the westward as far as possible, supported by a depôt-sledge under Lieutenant Giffard. Lieutenant Beaumont of the 'Discovery' was to lead the eastern division along the north coast of Greenland, supported by Lieutenant Rawson and Dr. Coppinger; and Lieutenant Archer, of the 'Discovery,' supported by Sub-Lieutenant Conybeare, was to proceed down Lady Franklin Sound, which was at that time believed to be a strait. In addition to this, Lieutenant Fulford was to explore Petermann Fiord; while scientific exploration was to be carried on by the naturalist and officers returning from the depôts. It will be seen that this scheme, making allowance for the difference in the number of men, was as broad and comprehensive as those of any former expedition; while the work of the northern division was more difficult than any that had previously been attempted.

The 3rd of April, 1876, was fixed upon as the day of departure for the 'Alert's' travelling parties, when the thermometer was —33°. In former expeditions the temperature has been equally low for a week or so during the April travelling, but the same amount of continuous cold in April and May has never before been faced, and the beginning of April in 82° 27′ N. was really equivalent to the middle of March in 75° N. For in 75° N. the sun returned on February 3rd, and had been enjoyed for fully two months before the sledge parties started. But in 82° 27′ N. it did not return until February 29th, and the men had only felt its beneficial effects for one month before they started.

At 11 A.M. of the 3rd of April, 1876, seven sledges were drawn up in line on the floe, with their standards hoisted. The MARCO POLO, Captain Markham's twelve-man sledge, with nine men, had on it the 20-foot ice-boat, and each man had to draw 236 lbs. Lieutenant Parr's sledge, the VICTORIA, had on it the 15-foot ice-boat; and the two auxiliaries were the BULLDOG commanded by Dr. Moss, and the ALEXANDRA by Mr. White. Another sledge, the BLOODHOUND, under George Bryant, a petty officer of the 'Discovery,' accompanied them for four days as a support. The western division consisted of the 'CHALLENGER,' commanded by Lieutenant Pelham Aldrich, and the POPPIE by Lieutenant Giffard. In all fifty-three officers and men left the ship, out of a complement of sixty-six, including six men of the 'Discovery.'

After prayers they commenced the march at 11.30 A.M., having previously given Captain Nares three hearty cheers. The cold was intense, falling to —45° a few days after leaving the ship, and until the 28th of April the temperature never reached to zero. On the 7th the BLOODHOUND was sent back, and on the 10th the other sledges reached the autumn depôt near Cape Joseph Henry. Here the BULLDOG returned with Dr. Moss and Mr. White, while the ALEXANDRA was taken on by the northern division, which then consisted of two officers and fifteen men, dragging three sledges, two of which carried heavy boats. They were filled up with provisions for sixty-three days, but the work before them was tremendous. Their only mode of advancing was by a system of double banking the whole time, which, with three sledges, simply meant one mile made good for every five marched. The boats, with gear, weighed 800 and 500 lbs. Yet there was no alternative, for the impossibility of depending upon depôts laid out on a frozen sea which might break up, and the necessity of taking boats for the same reason, made any reduction out of the question.

On the 11th of April the northern division parted company with Aldrich and Giffard, and marched due north over the Sea of Ancient Ice. It consisted of very small and rugged floes, separated by ranges of ice hummocks from 30 to 50 feet high and sometimes a quarter of a mile wide, while the occasional streams of young ice at the foot of the hummocks were too narrow and small to be of much service for travelling upon. The hummock ridges consisted of a vast collection of *débris* of the previous summer's broken-up pack ice, which had been refrozen during the winter into one chaotic rugged mass of angular blocks of every possible shape. Much time had to be devoted to clearing roads through the hummocks with picks and shovels, and the intermediate floes of ancient ice were very rugged and heavy for travelling; and never as much as a mile in width. Their surfaces were thickly studded over with rounded, blue-topped ice humps 10 to 20 feet high, the depressions between them being filled with snow deeply scored into ridges by the wind. The prevailing wind during the winter was from the westward, and, the course of the sledges being due north, the ridges caused by the drift were at right angles, and further increased the ruggedness of the road. The whole formed the roughest line of way

imaginable, without the slightest prospect of ever improving.

Over this line of way they had to make progress, going five times over the same ground, and while working ten and twelve hours a day, and walking over a dozen miles at least, besides road-making, only making at most 2 miles good. It is impossible to conceive more disheartening work, or work that could more fully try the highest qualities of the men. No excitement, no rest, no change; but continuous and intensely hard labour, with scarcely any progress, accompanied by hardships and privations of no ordinary kind. Supported by a sense of duty, by that devoted courage and confidence in their officers which makes seamen of the British Navy follow whithersoever they are led, these gallant fellows struggled on until they dropped; and not a single murmur or complaint was heard throughout the whole journey. With the temperature at — 35°, much snow-drift, and a gale of wind, combinations which occurred frequently throughout April, they were in a condition of extreme wretchedness.

On the 15th of April there was a gale of wind from the north, and the temperature fell considerably. It is remarkable that, throughout the winter, there was always a rise of temperature whenever there was a gale of wind, the wind coming from south and west. This fall of temperature with the wind from the north was a conclusive proof that there was no water in that direction.

On the 16th the fatal disease which so enhanced the difficulties of this memorable journey made its appearance. One of the men, who had been slightly ailing for some time, now broke down and had to be put on a sledge. This was equivalent to losing two men, for while his dragging power was lost, his weight was added to what the others had to drag. Still they zealously and cheerfully pushed on, resolved to march northwards to the utmost limit of their endurance. For many days Cape Joseph Henry was in sight, a bold and nearly perpendicular cliff rising to a height of about 1200 feet, and composed of mountain limestone full of fossils.

On the 17th, George Porter, a gunner of Royal Marine Artillery, was attacked by scurvy and unable to drag, which further increased the work for the other men; and next day it became necessary to put the poor fellow on the sledge: so that the weight of four men was added to the load to be dragged, two lost for dragging and the same number added to the dead weight. On the 18th they were quite clear of the shore-floes and hummocks, and had reached the veritable Palæocrystic Sea, consisting of floes of immense thickness, with most uneven surfaces.

It now became apparent that, in their weakened state, it would be impossible to drag the heavier of the two boats any further, without lessening materially the total distance to be made good; and, moreover, it was evident that the chances of its being of use were infinitesimally small. For mere ferrying the small boat would suffice. Captain Markham, therefore, assumed the responsibility of abandoning the 20-feet ice-boat on the 19th of April, and he thus reduced the weight to be dragged, and brought it down to what it was before the two men broke down. Occasionally a long stream of young ice gave them good travelling for a short distance between the hummocks, but otherwise the difficulties increased as they advanced from the land.

On the 28th of April, in latitude about 83° 8′ N. they came across the tracks of a hare. The poor creature had no doubt lost its way, and wandered from the land, and it must have perished at a short distance from the spot where the prints of its weary little feet were seen. This was the only trace of animal life they saw on the march out over this desolate frozen sea. On the 28th the temperature was above zero for the first time! but on May 7th it was again down to — 11°.

All the men were becoming much weaker, yet they lost no particle of their pluck and determination to work until they dropped. But on the 3rd of May three more had become absolutely unable to drag, and by the 6th there were three on the sledges. Still the rest pressed onwards, though suffering from great stiffness and pains in their legs.

On the 4th of May, at a distance of about 20 miles from the land, the hummocks forming the edge of a floe were discoloured by mud, showing that they had been pressed against a shore during some previous season.

It is perfectly marvellous that this little band of heroes should still have been able to press onwards, themselves weak and in great pain, and dragging five of their comrades on the sledges. On the 8th Captain Markham began to serve out the lime-juice. This antiscorbutic had never been a part of the regular daily diet for sledge parties in former expeditions, indeed the additional weight made it out of the question, but in the original schemes there was a-quarter of an ounce daily for each man; and about the same quantity had been taken on this occasion in two quart bottles. It was henceforth served out for the sick every other day. Out of the small band of fifteen men and two officers, five were absolutely prostrate, and threatening symptoms had appeared in some of the others.

At length, on the 10th of May, the struggle against impossibilities was given up, and the most northerly camp was pitched. A hole was cut through 64 inches of young ice that had formed among the hummocks, and soundings were obtained in 72 fathoms, mud and two species of crustaceans, as well as foraminifera, being brought up. Temperatures were obtained at every ten fathoms, as well as the specific gravity of the surface water. Good observations were also obtained for both latitude and longitude. On the 12th of May, leaving the two cooks in charge of the invalids, the two officers and eight remaining men started to the northward immediately after breakfast, carrying the sextant and artificial horizon and all the colours. After a very severe march over hummocks a halt was called at twenty minutes to noon, the artificial horizon was set up, and five flags fluttered out bravely before a southerly breeze. They were the standards of Captain Markham and Lieutenant Parr, the motto flag of Captain Markham, the flag of Captain Nares (a Union-Jack with his crest and motto in the centre) and a white ensign. A good latitude was obtained at noon: 83 20′ 26″ N., or 399½ miles from the Pole, the nearest approach that has ever been made. Three cheers were given, and one more for Captain Nares, and they all sang the "Union-Jack of Old England" and the grand Sledging Chorus, winding up with "God save the Queen."

They then returned to the camp. The flags were kept flying at the encampment for the remainder of the day. The evening was passed pleasantly, and all, even the invalids, were happy, cheerful and contented, in spite of their terrible sufferings.

On the 13th they were homeward bound. Never, in the whole annals of Arctic prowess, full as they are of deeds of gallantry and devotion, had men persevered so long and with such desperate tenacity against the impossible; actuated solely by devotion to their duty and by the desire to advance the honour of their country.

The return march showed how fearfully close they had gone to the limit of safety. Very soon two more men were attacked, and on the 27th of May the smaller boat was abandoned. It was a hazardous alternative. If they continued to drag this additional weight, while becoming weaker every day, they might never reach the land; while there was a probability of finding a lane of water, between the ice and the shore, which would be impassable without a boat. Already there were evident signs of disruption in the ice. But Captain Markham chose what he considered, and what proved to be, the lesser of two evils. He abandoned the second boat, leaving a record in it, the mast up, and yard triced up. A turnstone was seen on the 27th, and a snow-bunting on the following day. It is noteworthy that the only living things seen up to this time, during the journey over the frozen sea, were two land birds. On the 4th of June a skua was seen.

Several of the men who still tried to drag were now in great pain, and suffering from scurvy, but still they held out most pluckily, sticking to the drag-ropes until they could stand no longer. The officers had long been working at the drag-ropes just the same as the men; and on May 28th only four were free from scurvy, namely, Captain Markham, Lieutenant Parr, John Radmore the chief carpenter's mate, and a young able seamen named Maskell. Seven others, Rawlings, Jolliffe, Harley, Laurence, Pearson, Simpson, Winstone and Ferbrache still gallantly stuck to their work. Day by day they got worse, and the appetites of the whole party were gone. On the 30th Captain Markham's sledge was dragged by three men and himself, entailing labour which would soon have overpowered them. On the last day of May the signs of disruption became still more evident, and their safety or destruction was a question of hours: some of the hummocks had actually moved since they passed them on the outward march.

On the 2nd of June only two officers and six men were left to drag, and they had to go over the ground three times, first bringing up one sledge, and then the two others. Those men who were just able to put one leg before the other bore up nobly, and followed the sledges. In dire distress, many of them at death's door, they got to the land on the 5th of June. It was clear that they could never reach the ship alive without assistance, but they struggled on for one more day, and on the 7th Lieutenant Parr was despatched to the ship for succour. It was a long distance, over 30 miles, but he did it without a halt in his weakened state; and on the 9th the dog-sledge CLEMENTS MARKHAM, with Lieutenant May and Dr. Moss, arrived, bringing fresh meat and medical comforts. They were saved, but too late for one poor fellow, George Porter, who sank to his last rest on the previous day. The others were on the very verge of the grave and in a fearful state of debility. Of all that zealous company of strong and brave men who left the ship on April 3rd, only four could do work when they returned on the 14th of June, after an absence of seventy-two days. The MARCO POLO was dragged alongside the 'Alert' by Captain Markham, Jolliffe, Radmore, and Maskell. They had marched over 600 miles of ground.

All, except poor Porter, were restored to health. They were in the last stage of exhaustion and debility, and their recovery is due not only to the professional skill, but more especially to the incessant care and watchfulness, the gentle sympathetic kindness, and admirable nursing of Dr. Colan. If ever man deserved special honour and distinction for the performance of difficult services under most trying and exceptional circumstances, that man is the senior medical officer of the late Arctic Expedition.

The march over the Sea of Ancient Ice to the furthest northern latitude ever reached will be memorable in history, and it will take its place in the front rank among those exploits which are recorded in the annals of Arctic sledge-travelling.

Meanwhile, Lieutenants Aldrich and Giffard, having parted company with the northern division on the 11th of April, advanced along the shore. At first the way was difficult and double-banking was necessary, but afterwards they found easier travelling between the grounded ridges of floebergs and the beach. After crossing a wide and deep bay, since named Clements Markham Inlet, Lieutenant Giffard left a depôt, and returned to the ship, having been absent thirty days. He then laid out a second depôt to support the advanced party on its return. Aldrich, with the sledge CHALLENGER, continued his march to the westward, and succeeded in discovering and exploring the coast-line for a distance of 220 miles from the position of the 'Alert.' McClintock, in the longest of his sledge-journeys, attained a distance of 229 miles from the 'Resolute.' The smooth nature of the ice along the shore enabled Aldrich to do this work expeditiously with his one sledge. The coast was found to trend north of west for 90 miles, where Cape Colombia, in 83° 7′ N., is the northernmost extremity of America. The coast then extends to the west for 60 miles, whence it gradually trends to the southward to longitude 85° 33′ W., the extreme position attained. Along the whole coast the same heavy ice extended, which in all probability is continuous with that stretching along the west coast of Banks Island to the shore of North America. During the outward journey most of the party suffered slightly from scurvy, and on their return their weakness increased, but none became so bad as to make it necessary to place any on the sledge. Lieutenant May, with the dog-sledge, was sent out to meet and succour the western division, reaching them on the 20th of June, the very last day that most were able to travel. Aldrich himself was the only one of the party not attacked by scurvy. He reached the ship on the 26th of June, having been absent for 84 days, and travelled over 620 miles.

The eastern or Greenland division of sledges commanded by Lieutenant Beaumont, with the sledge SIR EDWARD PARRY, under whom were Dr. Coppinger, with the sledge STEPHENSON, and Lieutenant Rawson with

the sledge ARROWE, arrived at the 'Alert,' whence they were to start, on the 20th of April. Lieutenants Egerton and Rawson, as pioneers, had previously crossed Robeson Channel to the coast of Greenland, in order to select a good route. They found an extensive but very ancient floe stretching over the greater part of the way, and floebergs of enormous size were pressed upon the beach on the Greenland side. They returned on the 18th, and on the 20th Lieutenant Beaumont, accompanied by Lieutenant Rawson and Dr. Coppinger, left the 'Alert,' to explore a portion of the north coast of Greenland. Early in May Lieutenants May and Egerton crossed Robeson Channel, to place a depôt on the Greenland coast for Beaumont's return. The eastern division had then advanced as far as Cape Stanton, the coast line being formed of precipitous cliffs which receive the unchecked pressure of the northern pack as it drifts from the north-west and strikes upon that part of the land nearly at right angles. The floebergs were pressed high up, one over the other, against the steep shore, and the chaos outside was indescribable. Hence the travelling was extremely bad, seven days being occupied in moving only 20 miles. It was possible that the ice might break up in May, as it did in 1872, and a depôt of provisions was therefore left, sufficient to enable the party to return, if necessary, by land. This was a judicious precaution, though it considerably shortened the length of the journey outwards. On the 6th of May Dr. Coppinger parted company, and returned to Polaris Bay, opposite to the 'Discovery's' winter-quarters, and a few days afterwards one of the men showed symptoms of scurvy. The invalid was sent back to Polaris Bay on a sledge with three men, in charge of Lieutenant Rawson. Two of these men also broke down, and the sledge was dragged by Rawson and the remaining man, Elijah Rayner, a gunner of the Royal Marine Artillery. They reached the depôt at Polaris Bay on June 3rd, and the poor man who was first attacked, James Hand, died the same day. Captain Nares says in his Report: "I cannot praise Lieutenant Rawson's conduct on this occasion too highly; it is entirely due to his genial but firm command of his party, inspiriting as he did his crippled band, who relied with the utmost confidence on him, that they succeeded in reaching the depôt, where the survivors were restored to health with the help of some fresh seal meat, and Dr. Coppinger's professional skill and care."

Beaumont continued his journey until the 21st of May, when he had reached a longitude of 50° 40′ W., whence he sighted the most distant land in 82° 54′ N. and 48° 33′ W. By this time two more of the crew had been attacked with scurvy, and soon after the return journey had commenced the whole party was attacked. They became weaker day by day, until at last Lieutenant Beaumont, Alexander Gray (an ice-quartermaster), and Frank Jones (stoker) were alone able to drag. The other four men had to be carried forward on the sledge in detachments, necessitating treble journeys over terribly rugged ice. The gallant band struggled manfully onward, thankful if they made one mile a day, but never losing heart. On the 22nd of June Rawson and Coppinger set out with a dog-sledge from Polaris Bay, and met the weary party in Newman's Bay. Frank Jones broke down that day, leaving the three officers and Alexander Gray to drag the four invalids, the dogs carrying the gear and provisions. On the 27th Gray broke down, and the officers had to drag the sledge by themselves, and so they reached Polaris Bay on July 2nd. One of the men, Charles W. Paul, died shortly after their arrival. Captain Nares truly says that these details speak for themselves, and make it scarcely necessary to allude specially to the services of Lieutenant Beaumont. His fame is established as a most judicious, determined, and intelligent sledge-traveller and leader. Beaumont had seventy-two days of actual travelling, but was absent from his ship for 131 days.

Lieutenant Archer, with the sledge WESTWARD HO, set out on an extended journey up an inlet which it was imagined might prove to be a strait. He started on the 6th of April, but his expedition was brought to a premature close by Lady Franklin Inlet proving only to be a long narrow bay, so he returned on the 2nd of May, having been absent twenty-four days. Lieutenant Fulford and Dr. Coppinger explored Petermann Fiord.

Such was the sledge-travelling work accomplished by the Arctic Expedition of 1876. If it is remembered that the men who performed these services were suffering from an exhausting disease, that they had gone through the longest period of darkness that had ever been experienced by human beings, that the cold they endured was without precedent in its prolonged severity, and that they obtained no fresh meat, their work must be acknowledged to be altogether exceptional; and it will be seen that the mere figures, when set side by side with the figures recorded by other expeditions as regards times and distances, are insufficient for establishing a useful comparison. But even using the test of figures, the sledge-travellers of 1876 take a high and honourable place. McClintock, in his three journeys of 1851, 1853, and 1859, Mecham in 1853 and 1854, and Osborn in 1853, alone surpass them, and have never been equalled. But in all these journeys fresh food was obtained. In 1851, when McClintock was away eighty-one days and travelled over 770 miles, he obtained two bears, three musk oxen, and a reindeer. When in 1853 he was away 105 days, travelling over 1328 miles, he obtained 1629 lbs. of fresh meat. In 1859, during his absence of ninety days, he got seal's flesh, dried salmon and venison, a bear, two reindeer, and some other game. Mecham, in 1853, when he was away ninety-four days and went over 1163 miles, obtained 1460 lbs. of fresh meat; and Sherard Osborn, in 1853, was absent ninety-seven days and travelled over 935 miles, procuring 300 lbs. of venison, three bears, one seal, one musk calf, twenty ptarmigans, and thirty-six ducks.

It will be seen that McClintock and Mecham are *facile principes* among Arctic sledge-travellers, and, moreover, McClintock is the father and inventor of the whole system, which he continued to improve uutil it was brought to a high state of efficiency. With these two exceptions the sledge-travellers of 1876 are second to none, even judged by the test of figures alone. But if, as is necessary for a useful comparison, we consider the exceptional difficulties they had to encounter, and that they were suffering, during the greater part of the time, from a most painful and depressing disease, the work they accomplished was quite marvellous.

The following is a table of the other extended and long sledge parties; as compared with those of the expedition of 1876: taking the periods actually absent from any ship:

Commanders of Parties and dates.	Number of days away.	Mileage.	Cold experienced Degrees.
ALDRICH (1876)	84	630	—45
Murray Parks (1852) ...	74	—	
MARKHAM (1876)	72	600	—45
BEAUMONT (1876)	72	—	—45
PARR (1876)	72	600	—45
Hobson (1859)*...	72	—	—33
R. Aldrich (1851)	62	550	—35
Allen Young (1859)†... ...	61	—	—33
W. W. May (1853)	61	—	—23
Ommanney (1851)	60	480	—22
Osborn (1851)	58	534	—26
Nares (1853)	57	630	—33
Richards (1853)‡	56	—	—23
Hamilton (1853)	55	675	—16
Collinson (1852)	52	—	
,, (1853)	49	—	
Jago (1852)	49	—	
Browne (1851)	43	375	
Haswell (1851)	41	—	
GIFFARD (1876)	30	—	

There can be no better judges than their predecessors in the same work; and their labours have received the hearty approval of Collinson, Ommanney, Richards, McClintock, Allen Young, Hamilton, Nares and Haswell. Would that another great Arctic sledge-traveller had been spared to see the work accomplished, the resumption of which was due to his unwearied advocacy. Sherard Osborn would indeed have rejoiced to find how well and ably the young Arctics have taken up the traditions left them by their predecessors. How cordially and generously would he have recognized the difficulties they had to encounter, and the high qualities which enabled them to achieve so ample a measure of success. In Sherard Osborn, that brave and generous sailor whose remains were followed to their last resting-place by many officers of the Expedition then on the point of sailing, the cause of Arctic discovery lost its best and wisest friend.

The fierce outbreak of scurvy after a first winter is a phenomenon which should receive close and searching investigation. It enhances the merit of the work achieved by the explorers, for it could only have been through the exercise of manly qualities of no ordinary kind that the travelling could have been persevered in and accomplished in spite of such a terrible disease. The causes of its appearance must be sought by the light of former experience, and by comparison with the conditions influencing this and any previous Arctic Expedition which had no scurvy. We may take Captain Austin's Expedition of 1850-51 as one which was entirely free from this insidious disease. On comparing its arrangements with that of 1875-76 we find that the scale of victualling on board was practically identical, and that the diet for the sledge-travellers was also the same. The presence of scurvy in one expedition cannot, therefore, have been caused by the diet, because the scale of victualling was identical with that in another expedition which had no scurvy. The winter routine, as regards exercise, cleanliness, and ventilation was as carefully attended to and as fully carried out in the expedition of 1875-76 as in that of 1850-51. The arrangements for warming the 'Alert' and 'Discovery' were not so good as those in the 'Assistance' and 'Resolute'; still the arrangements of 1875-76 were sufficiently good to secure health, and this was proved by a periodical analysis of the air on the lower deck. There was no difference in the *physique* of the men, or, if there was, the advantage was all on the side of the 'Alerts' and 'Discoverys,' far greater care having been taken in their selection. A certain proof of the admirable *physique* of the gallant fellows who struggled so manfully against the disease is that all who reached the ships soon recovered their health, under the doctor's care, and that there was not a single man on the sick list when the ships arrived at Portsmouth. Yet they were snatched from the very brink of the grave; the span of life in many of them was not many hours long when succour reached them, and they were reduced to the last stage of exhaustion and debility.

In none of these conditions, the scale of diet, the winter routine, the *physique* of the men, the state of the ship, was there any difference between the two expeditions. Consequently the cause of scurvy must be sought elsewhere. We must seek for some point of difference. Now there is one point of difference between the circumstances of the two expeditions which may have had such influence as entirely to account for the outbreak. The absence of the sun and consequent darkness, for a prolonged period, undoubtedly has a deleterious effect on men's constitutions. In Captain Austin's Expedition, the sun was absent for ninety-four days. At the 'Alert's' winter-quarters, during 142 days the sun never made its appearance. The 'Alert' passed through a period of darkness which was longer by forty-eight days, or half as long again, as that endured by the men of Austin's Expedition. In 75° N., where former expeditions wintered, there was never total darkness at noon; while at the 'Alert's' winter-quarters there was total darkness at noon from November 6th to February 5th. It may be added that the inevitable damp on the lower deck must also be more or less injurious during the winter, and that exposure to it for 142 days will have a worse effect than exposure for only ninety-four days.

Like the explorers of 1851, those of 1876 emerged from their long period of darkness apparently in perfect health, as strong and active as ever, and full of zeal and enthusiasm for the spring travelling. Yet the prolonged darkness had sown its seed, and there was the predisposition to scurvy in every soul, officers and men. If there had been no travelling the scurvy would never have made its appearance, except in the cases of a few men, such as the ship's steward and cook, whose work had previously been of a sedentary nature. The 'Polaris' wintered nearly as far north, but her people had no sledge-work that is worth mentioning, yet there was scurvy on board. With the predisposition existing, the exceptionally severe work in sledging brought the disease out; and it could not be checked or got under owing to there being no possibility of procuring large supplies of game, and to the quantities of lime-juice not being sufficiently abundant.

* Attacked by scurvy.
† After a day's rest went away again for fourteen days.
‡ To 'Resolute': 30 days returning. Total 94 days, 860 miles.

In future it must be borne in mind that the Polar Regions and the Arctic Regions are different; and that, owing to the greater danger of scurvy in the former, by reason of the longer darkness, much greater care must be taken to secure variety in diet. It is also clear that it is not safe to undertake such long journeys in the Polar Regions as are quite safe further south. In journeys of the number of days' absence that were undertaken in 1876, it is simply impracticable to carry an abundant supply of lime-juice with the additional fuel to thaw it. The journeys must be from forty to fifty days, instead of from seventy to eighty days; and depôts of medical comforts must be laid out half-way. Moreover, the months must not be looked upon as equivalent, for the April north of 82° is really the March of 74°; and May should be the month for starting the sledge-travelling, not April. If the matter is investigated, the causes ascertained, and the necessary precautions taken in future, an important lesson will have been learnt at a heavy cost; but there ought to be no reason to fear a repetition of the calamity on any future occasion.

The breaking out of this virulent disease made it absolutely necessary to return home after the first winter. To have remained out for a second winter would have entailed a heavy, unnecessary, and most unjustifiable loss of life.

It remains for consideration whether the work had been done so thoroughly and completely, in the direction of Smith Sound, during the first season of sledge-travelling, as to render it incumbent upon Captain Nares to return, even if all had gone well, after having convinced himself that any further exploration would be better undertaken by another route.

The Admiralty Instructions, instead of adhering to the true objects of an Arctic Expedition, which had been so frequently and clearly pointed out, namely, the exploration of the unknown region, followed the bent of popular folly, and stated that the primary object should be to attain the highest northern latitude, and if possible to reach the North Pole. The exploration of the adjacent coasts, which should have been the primary object, was made secondary. "General scientific results and the exploration of the unknown region, and not the mere reaching a particular spot on the earth's surface, should have been the main objects of the expedition."* The Admiralty Instructions add, however, that, "it is not to be lost sight of that, in the absence of continuous land, sledge-travelling over an uninclosed frozen sea, for any considerable distance, has never been found practicable." In paragraph 18 is the instruction "to use the best endeavours to rejoin the consort in 1876, and return to England, provided the spring exploration has been reasonably successful."

The true objects of Arctic exploration have been fully entered upon in the early part of this article. Captain Nares had successfully secured them all, so far as the route by Smith Sound was concerned. He had explored the portion of the unknown region that could be reached from that direction, to the north, the west, and the east; discovering a line of coast extending over nearly 50 degrees of longitude, ascertaining the nature of the Polar Sea bordering the newly-discovered coast, and making an exhaustive scientific examination of land and sea. The land trended east and west, and, as there was no continuous land to the northward, it was, as the Admiralty Instructions anticipated in that event, impracticable to reach the Pole by the Smith Sound route. The orders were, however, to attain as high a northern latitude as possible; and how nobly and gallantly the Union-Jack was advanced further north than any flag had ever flown before has now become a matter of history.

Before the navigable season returned Captain Nares had completed the exploration of every portion of the unknown region that could possibly be reached from his winter-quarters. The question would have had to be decided whether the ship could be removed to another position whence a further advance of any importance could be made either to west or east. It was found that, in an exceptional season, it was possible that a ship might be able to advance along the land a little nearer to Cape Joseph Henry, and that on the east shore she might reach Newman Bay; but no vessel could ever round Cape Joseph Henry or pass beyond Cape Brevoort in navigable water. It was, therefore, evident that the continuation of the discovery of the north coast of Greenland and the west coast of Grant Land must be undertaken by other routes; the former by the east coast of Geeenland, and the latter by Jones Sound.

The work of the Expedition having thus been done, and done thoroughly and completely, the spring travelling having been not only "reasonably" but abundantly successful, it was the duty of Captain Nares, even if the outbreak of scurvy had not made such a course imperative, to return home in 1876. Further discovery would better be prosecuted by other routes.

The return from the winter-quarters to Baffin's Bay involved as difficult and dangerous a navigation as the advance. After considerable labour in clearing away a passage through the barrier of floebergs, the 'Alert' succeeded in rounding Cape Rawson and entering Robeson Channel on her return voyage, on the 31st of July, 1876. But a floe, a mile and a-half in diameter, was pressed close against the land, 4 miles north of Cape Union. The ship was secured in a small indentation among a group of grounded floebergs. Early in the morning of the 1st of August the floe began to drift to the north with the whole force of the tide, scraping along the ice foot as it advanced towards the ship. Captain Nares cast off, and skilfully "passed between the floe and the shore just as, after a severe wrench against a projecting point of land close ahead of the ship, a channel was opened by its rebound, and, as it coach-wheeled round, the north point of the floe turned in towards the land close to the position which they had vacated a few moments before." A man must have a quick eye and iron nerves for work like this! "The polar floe (some 80 feet thick) which they only escaped by a few yards, on nipping against the heavy breastwork of floebergs lining the coast, some of them 40 feet high, and many thousands of tons in weight, tilted them over one after another, and forced them higher up the land slope, like a giant at play, without receiving the slightest harm itself, not a piece breaking away." The escape of the 'Alert' from destruction was a question of minutes. Ordinary floes, such as are met with in Baffin's Bay and Barrow's Strait, are torn to pieces as they press past obstructions of this nature; and the difference between an ordinary

* *Threshold of the Unknown Region*, p. 325.

floe and the Polar Sea ice was here completely exemplified.

Captain Nares then boldly ventured into the pack, in the hope of being drifted round Cape Union with the flood or south-going tide; and he steamed out of it just as the ice began to set to the northward again with great rapidity. Steaming down through a narrow lane of water between the ice and the shore, they passed Lincoln Bay without trouble. It was only by the closest watching of the tidal movements of the ice, and by matchless seamanship in taking prompt advantage of every chance, not only that any progress was made, but that the ship was saved from destruction. On the 4th of August the 'Alert' was stopped by the ice south of Cape Beechey, and Lieutenant Egerton was sent across the hills to communicate with the 'Discovery,' a walk of 20 miles. On the 7th the pack drifted in, and two heavy pieces wedged themselves against the 'Alert,' nipping her to such an extent as to raise her bodily 5 feet. The only chance of release was to cut away a heavy piece of ice aground outside the ship. All hands were set to work with pickaxes to lighten it, and, after three days work, it floated at the top of high water, on the 10th of August. The ship was freed, and, the main pack moving off, the 'Alert' succeeded in once more joining company with the 'Discovery.' Here there was a delay until the 20th of August, when the two vessels pushed their way through the pack, and the 'Alert' entered a bay south of Cape Lawrence. She was driven ashore by the ice, and at low water she had her fore foot and keel high and dry, as far aft as the main channels, the ship lying over on her bilge. An excellent way was then adopted for laying out an anchor. It was lowered on to a suitable piece of ice, which was hauled astern to a proper position. The ice was blown up with powder, and thus the anchor was laid out. Then, at high water, the ship was hauled off without having received any injury. On the 22nd a south-west wind opened a passage, and on the 25th they had rounded Cape Frazer. There was then some delay, but a vigorous charge of both vessels together freed them from the last barrier, and they made a clear run to Cape Sabine. On the 9th of September they passed Cape Isabella, and once more entered Baffin's Bay.

The expedition was twenty-five days in going, and the same number in returning from Cape Sabine to the 'Discovery's' winter-quarters, a distance of 250 miles. The 'Alert' was seven days in proceeding thence to the Polar Sea, and twelve in returning, the distance being 76 miles.

The true work of the Expedition was to proceed up Smith Sound, to advance one ship to a position beyond the threshold of the unknown region; and thence to explore the undiscovered area in every direction, to the utmost extent possible with reference to the means at their disposal.

This has been done. Captain Nares, after encountering and overcoming greater difficulties from the ice than have ever been met with and overcome by any previous expedition except that of McClure, placed his ships in admirable positions, the advanced one being well within the unknown region. The travelling parties explored south, east, and west; while one planted the Union-Jack further north than any flag had ever flown before. The whole of the newly discovered area has been thoroughly examined, and a rich store has been added to the sum of human knowledge in every branch of science. We propose, in a future number, to indicate the nature and extent of those valuable results which are the fruits of such unparalleled exertions.

The Expedition has thus been completely successful as regards all the useful objects for the attainment of which it was despatched from this country; thanks to the admirable seamanship of Captain Nares and to his high qualifications as a leader; thanks to the skill, ability, and intrepid conduct of his officers; and thanks to the bravery, endurance, and devotion to duty of the two ships' companies.

They have won a front place among Arctic worthies; and have been cordially and heartily welcomed into the brotherhood of Arctic explorers by the survivors of former expeditions. The mantles of Parry and Ross, of McClintock and Osborn, have fallen upon worthy successors; and once again we have, among the younger officers of the navy, most able ice-navigators and experienced sledge-travellers ready to come to the front when opportunities offer. We will not let the noble cry of Northward Ho! which Sherard Osborn raised ten years ago, and continued until it was taken up over the length and breadth of the land, die away after this one success, great though it be. It must be taken up until every other route by which the unknown region can be approached has been as thoroughly tested. We cannot always hope for so great a success as Captain Nares has achieved, for he who crosses the Arctic circle must be prepared to meet with perils and difficulties which no human efforts can overcome, even on the threshold. But failure is honourable when no effort has been spared to deserve better fortune, and through failure lessons are learnt which lead to success. Every Arctic Expedition increases our knowledge, and furnishes a valuable school for our navy; and the continuance of research in that direction will always be desirable. Next spring the 'Alert' and 'Discovery' should be despatched on a summer cruise along the polar pack between Greenland and Novaya Zemlya, once more to test the possibility of penetrating for any distance through it in a northerly direction, for no two vessels could be more admirably suited for the purpose. Then there should be a more important attempt along the east coast of Greenland, or the eastern shore of Wrangell Land. The exact route for further prolonged research needs mature consideration; but, whichever the route, the cry which Sherard Osborn raised must be raised again and again, the soul-stirring cry of Northward Ho!

LETTER FROM THE PRESIDENT OF THE AMERICAN GEOGRAPHICAL SOCIETY TO CAPTAIN NARES, R.N.

NEW YORK, *Nov. 14th*, 1876.

DEAR SIR,—I beg leave to tender my congratulations upon the safe return of yourself, and those under your command, from your expedition to the Arctic, and to express my admiration for the courage, perseverance, and ability displayed in the attempt to reach the Pole. I have never been a convert to the theory of an open Polar Sea, and of a region around the Pole "teeming with life," having never met with any facts

that seemed to warrant such a belief; but I have for many years been under the impression that the route by way of Smith's Sound was the most favourable one for an attempt to get to the Pole; and that there was a strong probability that it would be reached in that direction; and although the result of your expedition is not confirmatory of that impression, I am not the less sensible of the importance of what has been ascertained, and what is due for your gallant effort. You have the satisfaction of having penetrated farther than any other explorer, and of having brought back new and very valuable information respecting that region of the Arctic.

It is a duty and a pleasure to all who take interest in the advancement of the science of geography to appreciate and warmly acknowledge the value of the services of those who have enlarged the boundaries of geographical information; and in making this acknowledgment to yourself and your brave associates, no one can do so with greater sincerity than

Your obedient Servant,

CHARLES P. DALY,

President of the American Geographical Society.

CAPT. G. S. NARES.

X.

THE SECOND VOYAGE OF THE 'PANDORA.'

THE necessity for keeping up annual communication with the Arctic Expedition was met by the public spirit and enterprise of Captain Allen Young. In our number for July 1876 (p. 193), we gave a list of the officers and men of the 'Pandora' during her second trip; and in our number for June (p. 168) we announced that she sailed from Cowes on the 31st of May with mails for the Arctic Expedition.

On the 19th of July the 'Pandora' left Upernivik, and met with boisterous weather. On the 24th she was beset and very severely nipped during a gale of wind, being drifted by the ice up into the heart of Melville Bay, with no water in sight from the crow's nest. It was not until the 29th that Captain Allen Young succeeded in getting her clear of the ice, and reached the neighbourhood of Cape Dudley Digges in a heavy gale of wind, the seas smashing a whale-boat, filling the decks, and washing all the deck-load adrift. On the 1st of August the gale moderated, and Lieutenant Arbuthnot landed on the S. E. Cary Island, finding the 'Alert's' Depôt A in good order.

On the 3rd of August Captain Young anchored off Littleton Island, and found the cairn placed there by Captain Nares. He then examined the coast for a suitable winter harbour for the relief ship of 1877, in the event of the expedition not returning this year, and he reports a harbour in McCormick Bight to be well adapted for the purpose. It has every advantage, easy to enter, good holding ground, well sheltered, and with plenty of game in the neighbourhood. Captain Young gave to it the name of Pandora Harbour. Lieutenants Pirie, Becker, and Beynen made a survey of it on the 5th of August.

Next day the 'Pandora' reached Cape Isabella, and a large cairn was observed on the summit. But it was blowing a gale of wind, with the current carrying blocks of ice past the rocks to the southward, and a landing was effected with difficulty by Lieutenants Arbuthnot and Becker. Captain Allen Young resolved to land the loose letters, received just before sailing, at this point, and they were sent on shore to be deposited with a record. Lieutenant Arbuthnot returned with a record left by Captain Nares; and reported having found a small depôt with a cask, which he had not examined. Captain Allen Young was of opinion that this cask might contain further intelligence, and he returned to Cape Isabella on the 7th, for the purpose of a closer examination. But it was blowing hard, while there was momentary danger of being beset. The 'Pandora' continually crossed and recrossed the strait through pack, but was unable to reach the Cape so as to effect a landing. On the 19th she was driven back to the northward of Littleton Island, and the officers visited Polaris Camp and left a record there. The weather continued very boisterous, and on the 23rd Captain Allen Young decided upon landing the main portion of the mail for the Arctic Expedition on Littleton Island. Four cases and two casks were placed in the cleft of a rock, on the western point, with a notice in the 'Alert's' cairn to that effect. On the morning of the 25th Captain Young at length succeeded in steaming across to Cape Isabella, and Lieutenants Arbuthnot and Becker again landed to examine the cask. But it was found to be empty, merely placed there to receive letters; so a record was buried magnetic north of the cask, with a notice that the mails were at Littleton Island.

The 'Pandora' then bore away northward under canvas, but the main pack extended across the strait, and the navigable season was fast drawing to a close. At length, after having battled for so many days with storms, fogs, and ice in Smith Sound, Captain Allen Young determined upon returning to Upernivik, first touching at Whale Sound, to communicate with the natives. A family of them was found in Barden Bay, who reported having had a very good hunting season. Taking leave of these interesting people, the 'Pandora' arrived at Upernivik on the 7th of September, after a stormy passage.

Captain Allen Young took soundings, with temperatures, in Smith Sound. The greatest depth, in the parallel of Cape Isabella, was found to be 600 fathoms; and when this sounding was taken, a beautiful asterias, 3 feet in diameter, was brought up. The ice met with was of immense thickness, forming a most formidable pack.

On the 15th the 'Pandora' arrived at Godhavn, whence she sailed for England on the 21st. On the 16th of October she sighted the 'Alert' and 'Discovery' in 54° 38′ N., and 41° 30′ W., remaining in company until the 19th; and on the 4th of November she reached Portsmouth.

A complete series of magnetic observations was taken by Lieutenant Pirie, and a most interesting set of photographs by Mr. Grant.

Officers and men alike showed zeal and energy in the execution of a trying and hazardous duty; and Captain Allen Young derived the utmost assistance and support from Lieutenants Arbuthnot and Pirie; as well as from the two distinguished foreign officers who served under him, Lieutenant Alois Ritter von Becker, of the Austrian, and Lieutenant Koolemans Beynen, of the Dutch navy.

The relations of the officers and men of the Arctic Expedition will never forget the debt of gratitude they owe to Captain Allen Young for so generously undertaking to take up letters, and to endeavour to open communication with the ships in the far north, a precaution which it was imperative to take, although, owing to the happy return of the Expedition, the event proved it to be unnecessary.

HISSAR AND KULAB.

By N. MAYEF.*

THE system of the Thian-shan attains its greatest height in the Khan Tengri, to the east of the Isyk Kul, and considerably decreases in height as we reach its western extremity, where it is penetrated by the broad valleys of Ferghana, Zerafshan, and Shehrisebz. The last of these is bounded on the south by mountains—generally called the mountains of Hissar, but known to the natives under a variety of names. In the south-west these mountains extend to Kelif on the Amu, and their offshoots occupy the whole of the space between Kelif and Kerki, without quite reaching as far as the latter place. The Hissar Expedition of 1875 was fitted out with a view to the exploration of the country between these mountains and the Amu.† Our information of that country was, at that time, most imperfect. M. A. P. Fedchenko assumed that there existed here extensive steppe plains. He was led to adopt this opinion on account of the hot winds, known as gamzir or tebbad, which were said to prevail in the district of Hissar in summer, and to whose action was ascribed a dangerous disease called *tebb*, as well as intermittent fevers, which have rendered notorious the districts of Hissar, Kulab and Kunduz, and, indeed, the whole of the country bordering upon the Amu. But these conjectures respecting the features of the country under consideration have turned out to be erroneous, for in this south-western portion of the Thian-shan we met with broad valleys, opening upon the Penj or Amu. These were the valleys of Shira-bad, of the Surkhan, which is broad and fertile; the plain of Kurgan-tube on the Lower Vakhsh or Surkhab, and the plain of Kulab, which protracts as we approach the ravine of Khavalin. The valleys named, as well as those of Shehrisebz, Zerafshan, and Ferghana, are separated by ramifications of the Thian-shan, which are arranged like the ribs of a fan.

We have already stated that the Thian-shan decreases in height as we proceed towards the west. The Takhta Karacha Pass, on the road from Samarkand to Kitab, has a height of 5180 feet: whilst the Ak-rabat Pass, on the road from Karshi to Shir-abad, is at an elevation of 4590 feet. Nor are the passes lying between Darvaz, the Amu and the mountains of Hissar very elevated. Some of the more important are:—

Pass of Faizabad, on road from Faizabad to Narak, in the valley of the Vakhsh, 3350 feet.
Pass Guli Zindan, on road from Vakhsh to Baljuan, 3580 feet.
Pass Uzun-akyr (akur on map), on road from Baljuan to Kulab, 3610 feet.
Pass Kal-shadi, on road from Kulab to Kurgan-tube, 2200 feet.
Pass Tash-rabat on same road, 2590 feet.

The Thian-shan thus decreases in height as we proceed towards the south-west. Several summits in its main mass nevertheless rise far into the regions of perennial snow to the east of the meridian of Kitab. The snowy summits of Kalai-shiraya and Mas-kara-khoya, in the Hissar mountains, are plainly visible from Chim kurgan; and snowy mountains can also be seen from Karatagh, to the north-west of Hissar. Several of the larger tributaries of the Amu and Kashka Darya rise in glaciers and snow-fields. The river named last rises in the mountain group of Hazreti Sultan, on the eastern frontier of Shehrisebz. The other rivers of importance are:—

1. *Kyzyl-Su.*—It is formed by two rivulets, Shudarad and Kalai-shirad, which rise in the snow-mountains of Kalai-shiraya. Before leaving the hills this river passes through the Patar (Pitar) ravine, at the mouth of which stands the town of Yakobagh. The river is known there as Yakobagh Darya. Its waters irrigate the fields of Chim Kurgan, a large winter village (Kishlak) on the road from Yakobagh to Shaar. The Kyzyl-Su enters the Kashka Darya at Kara-bagh, but owing to the numerous *aryks* (canals) which it feeds, it only reaches it when flooded, and even then not in every year.

2. The *Khuzâr Darya* is a considerable river, which irrigates an important district. It is formed by two mountain streams, Katta-uru Darya and Kichi-uru Darya. The former of these rises in the mountain mass of Khantakhta, near the western extremity of the snow-mountains of Kalai-shiraya, whilst the latter descends from the northern slope of the Baisun Tau. These streams are of great importance to the inhabitants. Excellent mountain pastures exist near the sources of both, and the inhabitants of the two wealthy mountain districts (amlâkdârs) of Kalta-minar and Khara Khoval reside there during summer with their herds.* The two rivers unite near the mountain Kishlak of Kushlush, 16 versts above Khuzâr. The united river is known as Khuzâr Darya, and at the Kishlak Yangi-kent, 18 versts below Khuzâr, it divides into *aryks*. The valleys of the Khuzâr Darya and of its two head-streams are fordable throughout. We learn from Istakhri and Ibn Haukal that the Katta-uru Darya was formerly looked upon as the head-stream of the Khuzâr Darya and was known as Khuzâr-rud. The Jaj-rud (now Kichi-uru Darya) and the Khashk-rud (now called Kashka Darya) are mentioned among its tributaries.

Far more important are the rivers which rise on the southern slope of the Hissar mountains.

3. The *Shir-abad Darya*, known as Derbent Darya higher up, rises in the Baisun Tau, its source being near that of the Kichi-uru Darya. There are only few kishlaks along its banks. Derbent, the only one of importance amongst them, does not contain more than 500 houses. No kishlaks are met with between that place and Lailakan, for Munch is only a small settlement, and at Igerchi and Shady-bai there are only a few fields. The river, on leaving the mountains,

* *Izvestya Russian Geographical Society, XII.* Part 4, p. 349.
† Its members were N. A. Mayef, the Editor of the *Turkistan Gazette*, Lieutenant D. M. Vishnevski, M. F. F. Schwarz, as astronomer, and M. J. Kasbekof, as interpreter.

* The provinces of Bukhara are governed by begs appointed by the Emir. The begs appoint *amlâkdârs* for the principal towns and villages.

flows through the narrow ravine of Nana Dagana, and the road passes along its bed. Six versts below this ravine, in the plain of the Amu, lies Shir-abad, the scene of Ali's warlike deeds, but no longer of much importance.* The Shir-abad Darya is fordable. It irrigates the fertile fields of the district of Shir-abad, and does not every year reach the Amu, even in the spring, when flooded. Its waters feed numerous "*aryks*," and its volume is not sufficient for a regular annual supply in the case of some of the more remote villages. Buz-rabat, for instance, is supplied with water only two years out of every three.

4. The *Surkhan* is not only the most important river of Hissar, but also one of the more considerable tributaries of the Amu. Until recently it was known to geographers as the Tupalan. Faiz-Baksh, amongst others, mentions it by that name, which in reality is applicable only to one of its head-streams. The Surkhan is formed by several rivulets rising in the mountains surrounding the broad Surkhan valley. The most important amongst these is the Tupalan (Tup-lang), which rises in the snow-mountains of Meshai Kenteli and flows through the ravine of Shamal Agian. On leaving the mountains, near the town of Sary-jui, the river assumes the name of Sary-jui Darya. We may observe here that the rivers of Central Asia are generally named after the towns or kishlaks near which they pass. The Tupalan near Sary-osio is thus known as Sary-osio Darya. It is a rapid stream, not fordable, and crossed by a bridge about 2 versts above Sary-jui. Near that town its width is about 50 yards, at the bridge not more than 30 paces (25 yards).

If we look upon the Tupalan as the head-stream of the Surkhan, the Karatagh Darya may be described as the most important of its tributaries. It is not fordable, at least not near the town of Karatagh, where there is a permanent bridge. The Kalluk Darya, another tributary of the Surkhan, is formed by two mountain-streams, the great and little Kalluk, and passes through a ravine, along which leads one of the roads from the Surkhan valley to the upland plain of Baisun. Kalluk, a wealthy kishlak, lies at the mouth of the ravine.

The Khoja Ipak Darya, and its tributary the Kyzyl-Su (*i.e.*, red water), flow from the ravine of Khoja Ipak. The two rivers unite near Dehinau, and the fields of that town are irrigated from the Kyzyl-Su. Formerly, when the Surkhan valley supported a dense population, the Kyzyl-Su was of more importance, and a canal fed by it is said by the natives to have irrigated the fields of Termez.

The Sengri-dagh Darya is likewise formed by two mountain-streams. Its waters are absorbed by the *aryks* of the district of Yur-chi, and do not reach the Surkhan. The three rivers named last flow into the Surkhan from the west. The following are its eastern tributaries, viz.:

The Karatagh Darya, already mentioned; the Deshti-novat Darya, named after a wealthy kishlak, famous on account of its pomegranates; and the Regar Darya, on which is built the ancient town of Regar, the old rival of Dehinau, mentioned by old writers as Hissar Payan (*i.e.*, Lower Hissar), to distinguish it from Hissar Bala (Upper Hissar) or Hissar Shadman, that is Hissar the Joyful.

* Ali enjoyed the surname of "shir," *i.e.*, lion. The town was named after him (Shir-abad, *i.e.*, Lion's town).

There are no important tributaries below the Kalluk and Regar Daryas. The kishlaks become fewer as we proceed south. The swampy low banks of the Surkhan are fringed by reeds, rushes and shrubs, which afford shelter to tigers, boars, jackals and water-fowl of all descriptions.

The towns of Karatagh, Regar, Sary-jui Sary-osio, Yur-chi and Dehinau (Denau) lie in the broad valley of the Surkhan, which is capitally suited for agriculture. When Hissar was independent from Bukhara, this valley constituted its political centre, and tradition tells us that a cat might have run then along the roofs of houses from Dehinau to the banks of the Amu. The population now is far from dense. The principal settlements are met with in the northern portion of the valley, where the great volume of the tributary rivers renders irrigation easy.

5. The River *Kafir-nahan* is the second river of Hissar, as respects size and importance. It, too, is formed by several mountain-streams. In its upper course it is generally known as Roúmit Darya,* and it rises in snowy mountains, apparently near Poldorak.

On leaving the ravine of Roumit the river turns towards the west, and flows in that direction as far as Ming-tube (*i.e.*, One Thousand Hills), where it is joined by the Zigdi Darya. It then turns to the south, and maintains that direction as far as the Amu Darya. From where it turns to the west to its mouth it is known as river of Kafir-nahan (*i.e.*, Cavern of the Infidels). It is not fordable even in its upper course, and Yakub-beg Kush-begi built a bridge, 35 paces in length, near the town of Kafir-nahan. There exists, however, a difficult and dangerous ford, near Kabadian, on the lower course of the river. There are five important towns within the valley of the Kafir-nahan, viz., Faizabad, Kafir-nahan, Dushambe, Hissar, and Kabadian, the latter in the narrow lower valley of the river, at the foot of a mountain, named Peak A. Fedchenko by us. Near the mouth of the Khanaka Darya the river enters the narrow ravine of Pavi Duldul (*i.e.*, foot-prints of Duldul, the mythical horse of Ali). The town of Hissar stands near the entrance to this ravine. The valley of the river thence to Kabadian and further on to the Amu is hemmed in by mountains, no convenient road leads through it, and there are but few inhabitants. Several of the tributaries of the Kafir-nahan deserve to be mentioned.

The Zigdi Darya is the most important amongst them. It issues from the ravine of Varzob, at the southern entrance to which is the town of Dushambe, with a strong citadel commanding the steep banks of the river, which is here known as Dushambe Darya, and falls into the Kafir-nahan four versts below, at the Kishlak Ming-tube. The Zigdi is a rapid voluminous mountain-river, fordable only at a few places. One of these fords is at Dushambe, but it is dangerous, and not available throughout the year.

The Khanake Darya flows from a ravine of the Khanake Tau, and enters the Kafir-nahan at Hissar. Its water is used by the inhabitants of that town for purposes of irrigation. Both rivers enter on the right bank. Amongst tributaries entering on the left we mention the Ilek, which rises in the Yavan Tau, irrigates the fertile valley of Faizabad and enters the Kafir-nahan at the town of the same name.

* Ibn Dast, tenth century, mentions the Kafir-nahan under the name of Ramidom.

The remaining mountain-streams of the territory under consideration are but of small importance, and dry up, for the most part, in the beginning of May, after which they are nothing but arid ravines covered with *débris*. We mention the Khoja-murat-bagsh, a rivulet rising in the hills of Baisun, and irrigating the carefully cultivated fields and gardens of the fertile upland plain of Baisun, at an elevation of 3410 feet above the sea. This plain extends in a narrow strip, widening somewhat towards the west, along the mountains known as "Kotar" (*i.e.*, "freezing ones"). It is bounded on the south and east by the Buri-takhta chain, on the west by the mountains of Derbent, across which lead the passes of Sakyrtma (4200 feet), and Yalzyz-bagh* (4350 feet.) The famous ravine of the Irongate winds through a high mountain-chain, about 12 versts to the west of Derbent. It is a narrow cleft, 5 to 35 paces wide and about 2 versts long. It is known now as Buzghala Khana (*i.e.*, House of Goats). Its eastern termination is 3540 feet above the sea; its western termination 3740 feet. A torrent, Buzghala Khana bulak, flows through it, and reaches the Shir-abad Darya when flooded.

The district of Hissar is confined to the valleys of the Shir abad Darya, Surkhan, and Kafir-nahan. If we cross the Ghazi-melek mountains, towards the east, or either of its northern branches the mountains of Yarjid or Yavan Tau, we enter the mountain countries of the Upper Amu, for the Rivers Vakhsh and Penj are in reality the two head-streams of the Oxus. Politically the valleys of the Vakhsh and Lower Penj have always been distinct from the neighbouring valleys of Surkhan and Kafir-nahan. According to Ibn Dast (tenth century), Saghanian included the valley of the Surkhan and the Upper Kafir-nahan, whilst the powerful kingdom of Khotl included the Lower Valley of the Vakhsh, and forcibly obtained possession of the Lower Valley of the Kafir-nahan, with the town Kabadian, and advanced even to Faizabad on the upper course of that river. The plain of Kulab, as will be seen further on, formed the independent kingdom of Washgird. Saghanian thus occupied the Upper Surkhan and the Kafir-nahan; Khotl the plain of Kurgan-tube, and Washgird the plains of Kulab. We conceive this geographical arrangement of the three old kingdoms to be more satisfactory than what has been suggested by Rawlinson, Yule, Fedchenko and Lerch.

The Vakhsh rises in the snow-mountains of Alai, which bound Ferghana on the south. It crosses the plateau (*Bya* or *Pamir*) of Alai under the name of Kyzyl-Su. On reaching the boundary of Karategin the Kyzyl-Su receives an important tributary, the Muk-su, and is thenceforth known as Surkh-ab, which likewise means "red water." We have no trustworthy information respecting the course of the Surkhab through Karategin, as the mountain-country has not yet been explored by European travellers. Where the Vakhsh approaches the boundary of the Khanate of Bukhara it rushes through a narrow valley, hemmed in by the deep slopes of the Nur-tagh and Khojayukur. This defile, at one of its narrowest parts, where the rocks approach each other within 20 paces, is spanned by the well-known stone bridge of Puli-sengi. An exceedingly difficult path leads up to this bridge from the bank of the Vakhsh, and conducts from Faizabad to Baljuan and Kûlab. At many parts of it steps are cut into the rock; its most difficult portion is between Puli-sengi and the kishlak Durt Kaul.

The Vakhsh, between Darvaza-kala and Narak, flows from east to west, and then assumes its south-westerly direction. It passes through a ravine separating the Khoja Mastam and Tabakty mountains, and then enters upon the plain of Kurgan-tube (Khotl), flowing along the foot of the not very elevated mountains of Ark-tau and Samanchi. In the plain it separates into several branches, and is bounded by jungle. The main branch, in the plain, attains a width of 560 feet. It is crossed in *kayuks*, to which horses are attached, the usual method of crossing deep and rapid rivers in Asia. Another opportunity for crossing the river is afforded near the ruins of the old fortress of Lekhman (Leh'man), 24 versts from Kurgan-tube, on the high-road to Kabadian.

The two source rivers of the Amu, viz., the Vakhsh and the Penj, join 32 versts from Kabadian. Of the rivers flowing into the Penj we shall only mention those irrigating the mountain-districts of Baljuan and Kulab:—

1. The *Kichi-Surkhab* (*i.e.*, Little Surkhab), thus called to distinguish it from the Great Surkhab or Vakhsh. It rises in the mountains to the north of Baljuan, and irrigates the valley in which that town is built. It flows southward until it is joined by the Kulab Darya, and then turns towards the south-west, falling into the Penj about 48 or 50 versts below Kulab. It is a shallow but rapid mountain river, fordable throughout. The valley of Baljuan is not very wide.

2. The *Kulab Darya* rises in the snowy mountains of Kuza Furush, where it is known as Talwar, and then flows through the narrow ravine of Khowalin into the low swampy plain of Kulab. That town derives its name (the meaning of which is "lake water") from the swamps in its neighbourhood and from frequent inundations. It is dreaded quite as much as Kulduz and other towns in the lowlands of the Amu Darya, on account of its fevers and unhealthy climate.

The Valley of the Kulab Darya widens as we proceed south. At Pushian, a wealthy kishlak 8 versts below the Khowalin ravine, its width does not exceed half a verst; at Kulab it is already 5 or 6 versts. The plain slopes rapidly towards the south, the fall between Pushian and Khul-bagh, a distance of 30 versts, amounting to 590 feet. The Valley of Kulab supports a dense population, and is generally well cultivated.

The population of the districts of Hissar and Kulab consists principally of Uzbeks and Tajiks, the former predominating. The Uzbeks, as in the valleys of the Syr and Zerafshan, are gradually pushing the aboriginal Tajiks into the hills, and in the mountain-kishlaks of Hissar these latter have maintained themselves in greater purity than elsewhere. Derbent is exclusively inhabited by Tajiks, of whom many are not even able to speak the Uzbek language. The Kishlaks of Sir-ob, Yalzyz-bagh and others, near Derbent, are also inhabited by Tajiks, who predominate likewise in all the mountain-kishlaks built in the ravines of the Zigdè, Roumit and Khanake rivers. But in the upland plain of Baisun, (Baishin) to the east of Derbent, in the broad valleys of the Katta and

* Yalgyz-baga on map.

MAP OF HISSAR AND KULAB

Based upon the Astronomical Positions determined by SCHWARZ and the Surveys of Lieut. VISHNEVSKI, Members of the Expedition commanded by

Major MAYEF,
1875.

0 10 20 30 40 Versts.
0 5 10 15 20 25 Sta. Miles.

Heights in English Feet.

66° 67° 68°

39° 38°

Takhta karacha P. 5180
Kitab
Shaar (Shehrizebs) 800
Iskander Kul
Saratag
Mas Kara khoya (Snow Mts.)
Yako bagh
Karshi 820
Yangi kent, 7150
Yar tube, 1510
Kalai Shiraya Mts. (Snow)
Yalgull
Jaj Rud
Khuzâr 1370
Yarchakly
Sarai Kushkush 1540
Koipan Mts
Kalta minar R.
Kalta minar
Shakar bulak
Anar bulak
Kichi uru darya
Kara tash
Ak rabat P. 4590
Derbent, 2330
Baisun, 3470
Dukh kara kent 3840
Sir ab, 2980
Bath khurd (Salt)
Bash khurd Mts.
Kultyn tau
Shirabad Tau
Shirabad, 920
Talashkan, 600
Bur rabat
Chushka Khuzâr 300
Kara katar Ferry
Char tube
Shir ab Ferry
Patta kisar Ferry
Sengri Dagh
Meshai kenteli
Saryjui, 1610
Karatagh 2160
Ak Jar
Shir ab
Suji
Shirkent
Yurchi, 1210
Dehinau, 1080
Hissar 1540
Regar, 1510
Dushambe 2070
Ming tube
Naja
Khanake darya
Narza bulak
Gazi
Batash
Buz eiykh
Kalluk darya
Surkhan
Char dakhar Mts.
Kafirnahan R.
Bai khotin Mts.
Darwaz kam Mts.
Ak Tube Plateau
Ak kurgan
Kokaity payan
Mazar Khoja Abdul Termezi
Termez (Rt. of Gulgul)
Vakhsh or Surkhab
Amu Darya or Penj
Direction of Persi
Kabadiân 960
Fedchenko Pk
Ak mechet
Tush garbag, 520
Tush tumkas
Samanchi Mts.
Gara tuty 380
Baba Tagh
Ak khotin Mts.
Shaghman kuidy Mts.
Khan takhta Mts.
Makhy Mts.
Jaman dagh Mts.
Ak rabat
Kul kamysh
Kaptagai
Arpa-paya
Kokaity, 450
Min tut
Terni maram
Kum kurgan
Chandy khana Kar.
Karvan tushi
Kamanai kurgan
Yangi bagana
Yakhya khoja
Yegus gumbez
Naubakh
Mulla nazar
Buk kutak
Ak tash
Kara tikan
Kashka darya
Kamai
Kirghiz sarai
Kyzyl Su
Chimkurgan
Khishly
Karabagh, 1340
Nushkent
Chirakchi, 1340
Ismail
Chashmanbi
Yigre kul
Jaman Kulakly
Jaki
Kamai tam
Ferrak hatin
Mushkine
Barskaut
Tchobkent
Mt. jua
Kara khoja
Pisar Ravine
Hazret Sayyar
Ash kurgan
Shuk ared
Kalai Shiraya
Komadan
Shash tube
Yarchakly
Jaman dagh Mts.
Larsya bulak
Kara tash
Chashma R.
Ak dagana
Yakh archa
Chashmak Hafizjan
Kutun bulak
Rusta bulak
Ak rabat
Jaga
Kar khoral
Tenaj kharam
Asis P.
Shurab
Mazar
Chakcha
Iron Gate 3540
Jemshi
Pitau
Ar kadue
Tagat az
Chash tube
Sary kamysh 1940
Tumgai kurgan
Kafirun
Mazar
Munchi
Igerchi
Bur
Ak rabat aklych P. 1610
Jindy bulak
Chakcha
Aga bulak
Shady bai
Shady bai, 1150
Karsa agan
Kaptagai
Kaikaity, 450
Min tut
Kum kurgan
Chandy khana Kar.
Karvan tushi
Kamanai kurgan
Yangi bagana
Shirabad, 920
Yakhya khoja
Yegus gumbez
Terni maram
Naubakh
Talashkan, 600
Buk kutak
Bur rabat
Mulla nazar
Ak kurgan
Kokaity payan
Ak Tube Plateau
Mazar Khoja Abdul Termezi
Termez (Rt. of Gulgul)
Chushka Khuzâr 300
Kara katar Ferry
Char tube
Shir ab Ferry
Patta kisar Ferry
Amu Darya or Penj
Kuitun tau
Shirabad Tau
Baba Tagh
Char dakhar Mts.
Darwaz kam Mts.
Bai khotin Mts.
Samanchi Mts.
Ak khotin Mts.
Vakhsh or Surkhab
Direction of Persi
Kabadiân 960
Fedchenko Pk
Ak mechet
Tush garbag, 520
Tush tumkas
Gara tuty 380
Kafirnahan R.
Narza bulak
Gazi
Batash
Buz eiykh
Kalluk darya
Surkhan
Khanake darya
Dushambe 2070
Ming tube
Naja
Shirkent
Kajad
Hissar 1540
Regar, 1510
Saryjui, 1610
Karatagh 2160
Ak Jar
Shir ab
Suji
Yurchi, 1210
Dehinau, 1080
Shamgal tube
Samyrchi
Ammansai
Kyryl Su
Khoja agak
Khojalipak
Kallido
Kara tash
Kara kichik
Kara tikan
Kashka darya
Kamai
Kirghiz sarai
Kyzyl Su
Chimkurgan
Khishly
Karabagh, 1340
Nushkent
Chirakchi, 1340
Ismail
Chashmanbi
Yigre kul
Jaman Kulakly
Jaki
Kamai tam
Ferrak hatin
Mushkine
Barskaut
Tchobkent
Mt. jua
Kara khoja
Pisar Ravine
Hazret Sayyar
Ash kurgan
Shuk ared
Kalai Shiraya
Komadan
Shash tube
Yarchakly
Jaman dagh Mts.
Larsya bulak
Kara tash
Chashma R.
Ak dagana
Yakh archa
Chashmak Hafizjan
Kutun bulak
Rusta bulak
Ak rabat
Jaga
Kar khoral
Tenaj kharam
Asis P.
Shurab
Mazar
Chakcha
Iron Gate 3540
Jemshi
Pitau
Ar kadue
Tagat az
Chash tube
Sary kamysh 1940
Tumgai kurgan
Kafirun
Mazar
Munchi
Igerchi
Bur
Ak rabat aklych P. 1610
Jindy bulak
Chakcha
Aga bulak
Shady bai
Shady bai, 1150
Karsa agan
Kaptagai
Kaikaity, 450
Min tut
Kum kurgan
Chandy khana Kar.
Karvan tushi
Kamanai kurgan
Yangi bagana
Shirabad, 920
Yakhya khoja
Yegus gumbez
Terni maram
Naubakh
Talashkan, 600
Buk kutak
Bur rabat
Mulla nazar
Ak kurgan
Kokaity payan
Ak Tube Plateau
Mazar Khoja Abdul Termezi
Termez (Rt. of Gulgul)
Chushka Khuzâr 300
Kara katar Ferry
Char tube
Shir ab Ferry
Patta kisar Ferry
Amu Darya or Penj
Kuitun tau
Shirabad Tau
Baba Tagh
Char dakhar Mts.
Darwaz kam Mts.
Bai khotin Mts.
Samanchi Mts.
Ak khotin Mts.
Vakhsh or Surkhab
Direction of Persi
Kabadiân 960
Fedchenko Pk
Ak mechet
Tush garbag, 520
Tush tumkas
Gara tuty 380
Kafirnahan R.
Narza bulak
Gazi
Batash
Buz eiykh
Kalluk darya
Surkhan
Khanake darya
Dushambe 2070
Ming tube
Naja
Shirkent
Kajad
Hissar 1540
Regar, 1510
Saryjui, 1610
Karatagh 2160
Ak Jar
Shir ab
Suji
Yurchi, 1210
Dehinau, 1080
Shamgal tube
Samyrchi
Ammansai
Kyryl Su
Khoja agak
Khojalipak
Kallido

68°
69°
70°
39°
38°
Iskander Kul
Saratag
Meshai kenteli
Shamal agian Tarike
Karatagh 2160
Ak Jar
Shir ab
Suji
Shirkent
Saryjui, 1610
Kara chuluk 1510
Germin
Shamadian
Sary asio
Tuyuksen
Sengri Dagh, darya
Yurchi, 1210
Shamgal tube
Dehinau, 1080
Samyrchi
Ammansi
Batash
Buz eiykh
Kalluk darya
Kaptagai
Arpa-paya
Kakaity, 490
Min tut
Kakaity payan
Ak kurgan
Kum kurgan
Karvan tushi
Chandy khana Rav.
Ak Tube Plateau
Baba Tagh
Surkhan
Nurpak ablych P. 1610
Degat az
Chash tube
Sary kamysh 1940
Karsa agan
Jindy bulak
Chajcha
Aga bulak
Shady bai
Shady bai, 7150
Mazar Khoja Abdul Termezi
Termez (Kh. of Gulgul)
Amu Darya or Penj
Regar 1510
Kajal Hissar 1580
Khanake darya
Dushambe 2870
Ming tube
Shaikh mansur
Khazret mubarek
Chakh mazar
Kafirnahan 2330
Chashka i akach
Tumkulan
Faizabad 3030
Ilek darya
Surkh ab
Varzob
Varzob tagh
Roumit tagh
Roumit darya (Kafirnahan)
KARA TEGIN.
Naja yavan Tau
Kaudon
Khairgvat 3350
Nur tagh
Pul sangi
Kaudon Mts. Narak 1940
Durt kaul
Darvaza kala
Kuli safian
Yailau
Guk zirgan 3580
Kangur 2150
Pass
Baljuan, 2130
Faizabad
Karategin Mts.
Khoja yukur
Kichi Surkhab
Nafy tagh
Sebistan Tagh
Khoja Mastam Mts.
Jilandy Plateau
Baljuan tagh
Tabakty Mts.
Kara tau
Alimtai Plateau
Kalsha di P. 2220
Saldury
Charbagh
Ulum akur P. 3610
Sharshar
Ulum akur
Khavalin Rav.
Kulab darya
Pushian 1710
Yakkarcha
Obi Jangil
Chapty
Kulab 1740
Mulla sultani
Aigana
Salt Pits
Khul Ligh, 1070
Kulab Parush (Jaun)
Gazi melek Tau
Nazar bulak
Char dakhar Mts.
Darwazakam Mts.
Kafirnahan R.
Bai khotin Mts.
Ak tau
Samanchi Mts.
Ak khotin Mts.
Vakhsh or Surkhab
Kurgan tube, 540
Charbagh Chak
Mili Charbagh
Aurik's Sand
Tash rabat P. 2590
Tepchli Wells
Tegir Va. 3170
Tash tumkas
Tash garbag, 520
Ak mechet
Redchenko Pk.
Kabadian 460
Ferry
Ukhman
Garaudy (Silbur) 380
Direction of Penj in an unpublished M.S. Map of Expedition

Kichi-uru Darya, as well as in most of the districts rich in pastures, the Uzbeks predominate. The whole of the country between Baisun and the Segri-dagh and Shir-abad, as well as the banks of the Amu, and the district of Shir-abad, are occupied by Uzbeks of the tribe of Kungrad, the wealthiest of all. They occupy also the whole valley of the Middle and Lower Surkhan. In winter the Uzbeks descend from their mountains into the steppes of Karshi.

The Marka Kichi-yuz (*i.e.*, Marka of the Little Horde) who are also Uzbeks, nomadise in the valley of the Upper Kafir-nahan, to which they emigrated in 1866, after the Russians had captured the towns of Ura-tube and Jizakh. The *auls* of this tribe are met with everywhere, between Hissar and Dushambe. Uzbeks of the tribes of Lakai and Durban nomadise further south in the valley of Kafir-nahan and in the neighbouring mountains.

The population of the large towns in the valleys of Surkhan and Kafir-nahan is mixed, as everywhere else in Central Asia. Uzbeks and Tajiks have mingled in these towns, and it is impossible to draw the line between them. At the same time there cannot be a doubt that the Tajiks are the dominant race to the east of Dushambe. The mountain kishlaks of Varsob and Roumit Tau, the towns of Faizabad and Kafir-nahan and their environs are inhabited by Tajiks. But on the grassy slopes of the Sebistan Tau and in the valley of the Vakhsh, that is in the very midst of the Tajiks, we meet again with the *Yailan* (summer villages) of the Lakai and Khulmuk Uzbeks. These tribes hardly acknowledge the authority of Bukhara. They cultivate the whole of the Valley of Baljuan. The Lower Vakhsh is occupied by the auls and poverty-stricken kishlaks of the Durmen and Sary-Katagan Uzbeks. The warlike Katagan also occupy the plain of Kulab, and the present governor of that town, Sary Khan, is a Katagan by descent.

There still remain to be mentioned the Khirgiz who migrated recently from the Nurata district into Hissar. Up to that time they were known there only by name. They are found now on the Lower Vakhsh and on the Penj.

Baigush Turkmen live amongst the Kungrad Uzbeks on the banks of the Amu. "Baigush" signifies "poor devil" and these exiled members of various Turkmen tribes are poor indeed. The Bukharese call them Nantalap, *i.e.*, bread-seekers.

They live in rush huts (kibe), work at the various ferries, drive sheep from Afghanistan to Karshi and Bukhara, attach themselves to caravans, &c. The opposite Afghan bank of the river is likewise inhabited by Turkmen, but the Afghan Government has assigned them land on condition of their acting as a military frontier-guard, ready to obey the first call to arms.

A considerable fraction of the population consists of Lyuli (gipsies), Jugut (Jews), Hindu and Afghans. These latter are met with particularly in Shir-abad and Kabadian, where there are many houses of Afghan type, with cupola-shaped roofs. Augana, a kishlak near Kulab, is likewise inhabited by Afghan immigrants.

The Uzbeks are numerically the strongest amongst these various tribes, and their influence is so great, that the whole of Hissar is known at Bukhara as Uzbekistan, the Land of the Uzbeks.

The climate of the mountain valleys of Hissar and Kulab is no doubt very pleasant, for they are shut in by mountains in the north, and open into the plain of the Amu towards the south. At the same time the continental character of the climate is as well marked as throughout the remainder of Central Asia. The valleys are not much elevated above the sea-level, and their climate, as might be expected, is consequently mild. Baisun, the highest of all, has an elevation of 3410 feet, whilst the Amu at Chushka-Khuzâr* has an altitude of only 300 feet above the sea-level. The most elevated towns are Baisun (3410 feet), Derbent (2950 feet), Karatagh (2160 feet), Kafir-nahan (2330 feet), Faizabad (3020 feet), and Baljuan (2130 feet), and at these snow sometimes falls to the depth of an arshin. At places of less elevation the winter is warm, but rainy, and that such is the fact may be judged from the vegetation. The fig shrubs at Shir-abad, which have trunks nearly as thick as an arm, evidently remain unprotected in the open air during winter.

Hissar and Kulab produce in abundance all the cereals and garden plants indigenous to Central Asia. Cotton is grown in considerable quantities in the district of Shir-abad, whence it is exported by way of Khuzâr to Karshi. Its transport from more remote districts, and over difficult mountain-paths, would prove too costly. Dehinau, Hissar, and Dushambe export corn and flax to Bukhara. From Bash-khurd, a kishlak 64 versts from Khuzâr, is exported the well-known "Khuzâr rock salt"† and sheep are brought to Bukhara and Karshi from all parts of the district, and even from Baljuan, Kulab and Afghanistan. Wood (archa, a species of juniper, is used as timber) is brought down from the mountains near Ak-rabat to Khuzâr and Karshi. It is carried on mules, and a load generally fetches 4 tengas (about four shillings) at Khuzâr. Camels, mules, and horses are employed in the conveyance of merchandise from Hissar to Karshi and Bukhara. Not a single waggon is to be found in the district, and the wood "arba" is not even known there.‡

Salt is found at Bash-Khurd as well as at many other places, as, for instance, in the narrow valley of the Vakhsh, near the Nur-tagh. Kulab, Baljuan and even Badakhshan are supplied with salt from the mountains of Hazret Imam. A large number of brine springs prove that there exist inexhaustible stores of rock salt.

Auriferous sand has been discovered at two spots in the Vakhsh, viz., near the Kishlak Durt-kaul and near Kurgan-tube. The inhabitants wash the sand after the subsidence of the floods in spring, when a fresh supply of particles of gold has been carried down from the mountains. Very rich auriferous sands are stated to exist in Darvaz.

Politically the district of Hissar now consists of seven sub-districts, governed by begs, and Kulab of

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* Chushka-Khuzâr (*i.e.*, the Boar's Ford) is not a town. There are ten Turkmen huts there since last year.

† This salt finds its way as far as Tashkend, where it is known as Samarkand salt.

‡ The easiest road into Hissar is that from Shehrisebz by way of Yar-tube and Kalta-minar to Derbent. It is practicable for large bodies of troops, and joins the Karshi road at Ak rabat, a small building dating back to the time of Abdullah Khan, and now in ruins.

two such sub-districts, viz., Shir-abad, Baisan, Dehinau, Yur-chi, Hissar, Kurgan-tube, and Kabadian in Hissar; and Baljuan and Kulab in Kulab. In addition to these there are the districts of Derbent, Sary-jui and Faizabad, which are governed by *amlâk-dârs* appointed by the Emir direct. All other amlâk-dârs in the towns and kishlaks are appointed by the begs.

THE INDIAN SURVEYS, 1873-75,

THE Topographical and Revenue Surveys of India progress at the rate of about 40,000 square miles per annum, under the direction of Colonel Thuillier, who has had the conduct of the same for nearly 30 years past. The former are employed in the wild, hilly, and thinly populated British non-regulation districts, and Native States, while the latter are in operation where larger or more expensive surveys are required.

During the past two years the areas surveyed lay in Central India, Rajputana, the N.E. and S.E. parts of the Central Provinces, the Satpura Hills, and the N.E. frontier of Assam. By the end of the field season 1876-77, it is hoped that the whole of the unmapped portions of the Central Provinces will have been surveyed. The survey of Mysore, with an estimated area of 28,000 square miles, has been commenced. The total area topographically surveyed during the past two seasons, amounted to 45,834 square miles, besides large scale survey of eighteen cities, forts, military cantonments, civil stations, and forest reserves, while 42,267 square miles of secondary triangulation were laid out in advance of topography, and based on the work of the Great Trigonometrical Survey, so as to secure a skeleton framework of unquestionable accuracy. The details are sketched on a plane-table on the inch scale or $\frac{1}{63,360}$th of nature. The area thus finally delineated, at a cost to the State of 36 shillings per square mile, during the period in question, is over a third of that of the United Kingdom.

Much still remains to be done before a first survey of the British and Native possessions is accomplished, and what remains consists for the most part of wild, hilly, and jungle covered tracts, which have never yet been traversed by Europeans.

During the above period the cost of the topographical survey alone has been 83,938*l.*, giving an average cost of 36 shillings per square mile for the one-inch maps. The total area of final work produced by the Topographical and Revenue Surveys, including cadastral, or field by field surveys, on the sixteen and thirty-two inch scale, was 81,587 square miles, executed at an average cost of 71 shillings per square mile for the combined survey. During the past 30 years an area of nearly 826,389 square miles, being almost four times the area of France, has been surveyed by the modern Topographical and Revenue Surveyors, on a rigorous trigonometrical basis.

Since 1857 the demand for maps and plans has been increasing very largely; at that time it was chiefly for the use of the troops who were scouring the country in pursuit of the rebels. Since that time maps have been supplied in constantly increasing quantities for the making of roads, canals, railways, and all the various purposes of administration. The examination, correction, and compilation of all the maps sent in by the executive officers, devolves upon the drawing and compiling branch, which is admirably conducted by Mr. J. O. N. James, Assistant-Surveyor-General, a departmental officer of great experience. The fair mapping for the same period consists of 83 standard sheets of uniform size, viz., 15′ of latitude and 30′ of longitude, on the full standard scale of 1 mile to 1 inch. By the use of photo-zincography, the reproduction of the maps is immensely facilitated, and this has proved of the greatest possible service to the various government departments, the results being generally obtainable a few months after conclusion of field operations. Lithography is also extensively used, as well as chromo or colour printing, instead of the tedious process of hand colouring.

Of eleven engraved plates of the Indian Atlas (scale ½-inch to a mile), published during the two years under review, seven are complete up to margins. The total amount of maps turned out by the three printing processes in use amounted to 726,077 during the two years referred to.

Turning to the various executive parties, we observe that No. 1 party was engaged during the two seasons specified in the territories of Holkar and Scindiah, and the smaller interlaced native states of the Central India and Rajputana political agencies. Mr. Scanlan, Assistant-Surveyor of this party, gives a graphic account of Deolia, which was built in 1500 A.D., by Suraj Mal. At present it consists of all but tenantless houses and desolate streets, while absolute silence reigns in the highly decorated palace, with its galleries, balconies, and turrets, which once witnessed the revels of the Rajput chiefs. Both Pertabgarh and Deolia are noted for the manufacture of a peculiar glass jewellery, the secret of which is very jealously kept. Mr. Scanlan also furnishes an interesting account of the cyclopean troglodyte caves of Dhamnar, described by Tod in his Rajasthan. In the southern portion of the tract surveyed the white poppy is grown wherever well irrigation is available, and the cultivation of cereals being much neglected, the price of food grains is very high.

The second party was engaged in Khandesh and the Bombay Native States, under Mr. F. B. Girdlestone. This gentleman furnishes a description of the large but ruined city of Mando, the ancient capital of Malwa, whose walls are 30 miles in circuit. Its former splendour is attested by the enormous mass of ruins of palaces, tanks, and temples, and of towns and villages around. The rapid decay of the buildings is the result of the destruction of its ancient kings and armies by constant wars, which drove the tradespeople to other marts, and converted the townsmen and camp-followers into predatory hordes, afterwards notorious as Pindharees. The country traversed is both difficult and unhealthy, and is peopled by Bhils, who are very averse to their seclusion being intruded on, and who refused to furnish guides or to aid the surveyors in any way. Wild beasts, such as tigers, bears, leopards, bisons, were also abundant, and Mr. W. C. Barckley, while at work in the Satpuras, was so frightfully mauled by a bear as to be badly disfigured for life. From all these causes the provisioning of the party was a matter of great difficulty.

The operations of No. 3 party, under Captain Holdich, R.E., were continued in Bustar and the Zemindaries of the Central Provinces lying between the Godavery and the Indraoti Rivers, and a connection was established with the work of the old Hydrabad Survey. The area surveyed being one of the wildest and most inhospitable tracts imaginable, it was resolved to reduce the scale from the 1-inch to the ½-inch scale. A noticeable feature in this region is the "menhirs," or upright tombstones, planted along the sides of well-known roads, as well as trilithic monuments, these being similar to those observed by Captain Godwin Austen in the Khasia and Naga Hills. The Bustar jungles abound in very superior teak, and, as might be expected, the most valuable timber is to be found in the most inaccessible parts.

No. 4 party, under Colonel Depree was engaged in the Rewah Sate and in the Mandla, Balaghat and Bilaspur districts of the Central Provinces. The remaining area of the Central Provinces still requiring survey will probably be completed during the ensuing working season, and the whole of this important commissionership, aggregating about 114,000 square miles (and nearly equalling the United Kingdom in extent), will then have been fully mapped out.

The country surveyed by No. 5 party, under Captains Riddell and Wilmer, R.E., lay in Bhopal and Malwa, and some of the smaller native States in the Rajputana and Central Indian Agencies. It is described as flat and uninteresting, with low, isolated, flat-topped hills, with cultivated tracts where the poppy is greatly prevalent.

The Garo and Khasia Hills party (No. 5), under Captain Badgley, was engaged partly in the Manipur Native State and partly in the Naga Hills district. Opposition on the part of the Nagas was encountered at an early stage, and a Rengma village was taken in consequence. The Lanier river was surveyed and proved to join the Kyandwein, which flows into the Irawaddy, about latitude 21° 35′, and longitude 95° 10′, almost due west of Ava. It had previously been imagined to be a tributary of the Brahmaputra. During the following season (that of 1874-5) the party was broken up into three detachments, one, under Captain Badgley, in the Eastern Naga Hills; the second, under Lieutenant Woodthorpe, R.E.; and the third, under Major Godwin Austen, with the Military Expedition against the Dufflas.

To the first detachment Lieut. Holcombe was attached as Political Officer, and it was arranged that this party should enter the Eastern Naga Hills from Jaipur and work down toward the south, so as to meet the detachment under Lieut. Woodthorpe, R.E., who, accompanied by Captain Butler, the Political Agent of the Naga Hills, was to enter the hills from Golaghat and, working north-eastwardly, to join on to Captain Badgley's work. The last-named officer had, on the 2nd February, 1875, accomplished 729 square miles of triangulation and 657 square miles of topography, when the party was suddenly attacked by Nagas. Lieut. Holcombe and no less than 80 natives, sepoys, lascars, coolies and servants were slain, while Captain Badgley and 51 men were wounded. It appeared subsequently that a league had been formed among the people of some of the neighbouring villages for the utter destruction of the party. The effect on the men was so demoralising that they refused to advance, and Captain Badgley accordingly commenced a retreat, which he effected in a masterly manner, so as to call forth the praise of the court of inquiry afterwards held at Dibrugurh, under the orders of the commander-in-chief. Jaipur was reached on the 6th of February, and the wounded were there tended, but Captain Badgley was unable to take further part in the season's work. It is satisfactory to record that the force under Colonel Nuttall made short work of the villages, burnt them, drove the Nagas into the jungle and recovered a large proportion of the stolen property.

Lieutenant Woodthorpe's party was also attacked in its operations, and after receiving tidings of the massacre of Lieutenant Holcombe's party, orders were issued by the Chief Commissioner for them to await the arrival of the force sent to chastise the natives. During the interval, Lieutenant Woodthorpe reconnoitred and surveyed as much of the outer hills as could be visited. On the advance of the troops, opportunity was taken to survey the whole length of the outer and middle ranges south of Sibsagar, and part of Lakhimpur. The total area surveyed by this detachment was 1,507 square miles of triangulation, and 2,164 square miles of final topography on the half-inch scale.

While two detachments of No. 6 Topographical party were at work in the Naga Hills, the third, under Major Godwin Austen, accompanied the military expedition into the Duffla Hills on the northern frontier of Assam. Narainpur on the Dikrung Nullah was reached on the 2nd of December, 1874, and triangulation in the direction of the hilly tract was then pushed forward. The area surveyed amounted to 2,375 square miles, 1,705 square miles of this being entirely new ground. These results are very good, considering that the work was limited to a period of two and a-half months, during which time alone the military force was present. The lower ranges along the western frontier of the Burroi River were thus explored and mapped out, while the course of the Ranga River and its principal tributaries was determined by the work of Lieutenant Harman and Major Godwin Austen combined.

Though a large area of country was not surveyed by this detachment, yet much reliable information regarding the physical nature of the country, its geology, natural history, and the manners and customs of the people, was collected.

The Duffla villages are all small, and not built with a view to security, as with the Kukis and Nagas. The Dufflas themselves are short but well formed; they have strongly-marked Indo-Chinese features, and little or no hair on their faces. The hair on the head is tied up with yellow cotton thread, and then wound up, in the manner of a figure 8, about a long brass or wooden pin stuck horizontally across the top-knot. Their chief arm is that common to all the N.E. frontier tribes, the "Das," a long straight knife, with no cross-guard; spears are not often seen, but those met with were very long; a bow and arrows complete the equipment. They appear to be a strong, healthy race; they are well fed and well housed, and are expert trappers and fishermen.

A large and varied collection of plants was made by Mr. Lister, who had been deputed for that purpose, with Government sanction, by Dr. King, of the

Royal Botanical Gardens, Calcutta. Major Godwin Austen has contributed an account of the geological formation of the Duffla Hills, and a vocabulary of the Duffla language was obtained through Lieutenant MacGregor.

These military reconnaissances and explorations on the eastern frontier depend for success on so many conditions, physical, climatic, and political, that great credit is due to all concerned for the results derived. It is much to be hoped that the entire frontier will thus soon be examined and sketched up to the Patkoi range and the confines of Burma, to complete our geographical knowledge of all the country around the head of the entire Assam Valley.

No. 7 party, under Captain Strahan, continued to make good progress in portions of Ajmir and Mhairwara, and in the Native States of Jaipur, Shekhawati, Jodhpur, and Kishengurh of the Rajputana country. The country is described as flat and uninteresting, and as little better than a desert. Notwithstanding the lack of water, the tract is fairly well peopled, the inhabitants depending chiefly on grain imported from the north and north-west, about Delhi. They are addicted to the prevailing vices of Rajputana, viz., opium-eating and drunkenness. The chief trade is in salt; camels are bred in large numbers, a superior breed for riding purposes coming from Sujangarh. The Mhairwari Bunias, who are interested in the opium trade, adopt the ingenious plan of telegraphing particulars respecting the state of the opium market in Calcutta by mirrors flashed in the sun's rays across the desert, the electric telegraph conveying the intelligence as far as Ajmir. The large scale (24 inch to the mile) plan of Simla was satisfactorily brought to a conclusion by this party during the recess.

The Revenue Survey operations have yielded during the two years under notice an out-turn of 30,691 square miles of ordinary village survey, on the scale of 4 inches to the mile, and of 6,062 square miles of cadastral, or field by field survey, on scales of 16 and 32 inches to the mile. The entire cost of this branch, for the period named, was 206,957*l.*; the ordinary village survey costing Rs. 38 4 as., and the combined Rs. 56 5 as. per square mile, and the cadastral, or field by field survey, 3 as. 8 pie. per acre of final work.

Among the various officers employed on Revenue Survey work, Lieutenant-Colonel Anderson was engaged, under the special orders of Government, in defining the boundary between the British territory in Oudh and Nepal; Captain Samuells being engaged in the definition of the boundary adjoining the British districts of Purneah and Bhagulpur.

In the case of the work of the 8th division, under Colonel Oakes, which was employed part of the time in the Shahabad district of Behar, on a cadastral survey for irrigation purposes, the unit of measurement of the field was so infinitesimally small as to necessitate a survey on the scale of 32 inches to a mile. The expense of this costly survey is being defrayed from Public Works Loans extraordinary.

We propose to give in our next number a notice of the operations of the various parties attached to the Great Trigonometrical Survey of India during the season of 1874-75. The limited space at our disposal this month rendered it impossible to review the work of this department, without reference to which a notice of Indian Surveys cannot be said to be complete.

Reviews.

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THE AUSTRIAN ARCTIC VOYAGES.*

THE long-expected English version of Lieutenant Payer's narrative has at length appeared, and fulfills all the hopes we had entertained of it. Narrating the events connected with a most important discovery, it is full of interesting information, and is most pleasantly written.

Payer is one of those Arctic explorers who have grasped the real objects of their work, and the true principles on which it should be prosecuted. In his pages we find no folly about reaching the North Pole, or attaining the highest northern latitude possible. The object of an Arctic expedition, from his point of view, is to examine as large an area as possible of the unknown region, and to obtain valuable scientific results. His method of exploring is that which experience has proved to be the only successful one; to navigate along a coast-line in order to reach a good position for winter-quarters, and then to complete exploration by means of a carefully matured system of sledge-travelling. He holds that, so far as the exploration of the highest latitudes by means of ships is concerned, we have reached the limits of possibility in polar exploration; but that, with a ship advanced to a favourable position as a point of departure, many as yet unknown Arctic lands may be explored, with most valuable results, by sledge-travelling parties.

The introductory chapters are most valuable. They are the fruits of no small amount of experience, of careful thought, and of extensive reading. They enforce truths which it takes much repetition to establish, and their appearance is extremely opportune at the present moment.

Lieutenant Payer has done well to include in his work the pioneer voyage made with his comrade Weyfrecht in the Isbjörn in 1872. The object of this voyage was to ascertain whether the Novaya Zemlya Seas offer facilities for entering the unknown region. They came to the conclusions that the Novaya Zemlya Sea is open to a certain extent every year, probably up to 78° N.; that the time most favourable for navigation is during September, though it is hazardous, owing to the darkness, frequent gales, and formation of young ice; that this sea is shallow; that Gillis Land is a group of islands, and that there exist masses of land to the north-east of it; and that the band of warmer water which, near North Cape, is 150 feet deep, gradually cools towards the north, and becomes shallow.

These inferences led to the despatch of the Austrian Arctic Expedition, either to penetrate towards the north, or to pursue the direction of the north-east passage. The object of this expedition was neither to find an open Polar Sea, nor to reach the Pole. It was to explore a portion of the still unknown region; and it was believed that, owing to the influence of the Gulf Stream and the Siberian rivers,

* *The New Lands within the Arctic Circle.* Narrative of the discoveries of the Austrian ship 'Tegetthoff,' in the years 1872—74, by Julius Payer, one of the Commanders of the Expedition. With maps and numerous illustrations. Translated from the German. (2 vols. Macmillan, 1876.)

the direction they selected offered advantages. With these wise and well-considered views, the commanders of the 'Tegetthoff' left Bremerhaven in June 1872; and their patience, perseverance, and courage were rewarded by a great and important discovery. The exploration of Franz Joseph Land, by Payer, was effected by a close adherence to all the details of Sir Leopold McClintock's system of sledge-travelling; and the Austrian explorer acknowledges his indebtedness to his great predecessor in the most generous and cordial way. Here again Payer showed his wisdom, and his high qualifications as an explorer, by taking advantage of former experience, and working by its light. He is a true Arctic sledge-traveller, and a right good fellow, and his work, in its English dress, will, we sincerely trust, meet with the success it so well merits.

TURKISTAN.*

AN American in Russia has numerous advantages, which cannot be possessed by men of any national colouring. In the eyes of the popular mass, he is truly as much a foreigner as an Englishman; but while he is held in esteem as an Anglo-Saxon, he is not regarded in official circles with the political prejudice with which circumstances have, for some years past, beset the Britisher in the Czar's dominions. The Russian Government has ever coquetted with the United States of America, and American representatives, if not always specially favoured, are generally allowed to pass where they will as ordinary citizens of the world. Mr. Eugene Schuyler improved immensely upon this. By dint of acute observation and of study, he toned himself down to a similarity of hue and political opinion, as expressed in his desire that Russia should turn her Asiatic conquests to the utmost advantage in forming a "counterpoise to the power of England in the East." It is for this reason that he so strongly declaims against Russian barbarism and maladministration in Asia, which tend to the weakening of the moral influence of Russia among her Asiatic subjects; and it was for this reason also that he suggested in the Report to his Government, which received publication in General Cherniayef's paper at St. Petersburg, the means which Russia might one day employ for piercing the Anglo-Indian armour. For all that, however, and notwithstanding the disclosures so painful to Russians, we must unite with the latter in cordially thanking Mr. Schuyler—who has subsequently to his travels earned so much sympathy from humanitarians for disinterested philanthropy in Bulgaria—for a work embodying the results of much personal experience and research.

Whilst residing officially in Moscow, Mr. Schuyler devoted his leisure to the study of the Russian language, and on being removed to the United States Legation at St. Petersburg, he turned with a laudable thirst for occupation with utilitarian objects to the Anglo-Russian question of Central Asian Political Geography, when it began to gain prominence through Russian conquests, and delved into the Russian literary accumulations on the subject. Thus prepared Mr. Schuyler availed himself of a favourable opportunity of visiting the Russian Turkistan province, and proceeded to Tashkend, Samarcand, Bukhara, Kokand, and Kuldja, while he also exercised his influence in behalf of his countryman, Mr. MacGahan, who parted from him at Fort Perofski to witness the fall of Khiva.

The two volumes of Mr. Schuyler's Turkistan, which are already passing through a third and revised edition, form indisputably a highly creditable work. They are the result of several years' labour, of very diligent inquiry, embodying the gist of nearly all that has been written of late years in the Russian language on the steppes and khanats of Central Asia, and they bear the stamp of a very discriminating judgment in respect of all the author has himself seen and heard in Central Asia. Of its kind it is an unparalleled work, containing interesting narratives of travel, and being at the same time an elaborate and valuable compilation; it is just such a work as we fully expected from so perfect a Russian scholar as Mr. Schuyler is, and it will undoubtedly long remain a text-book on the Russian possessions in Asia, and pass to posterity as a standard work of reference.

Works of this kind are often made difficult of use by want of indices; Mr. Schuyler, however, has taken pains to furnish a very complete index, and in this respect the reader will find every facility.

Mr. Schuyler has not only had access to all the more modern Russian works on Central Asia, he has also made use of Russian and other authorities, which are rare, and quite beyond the reach of most Englishmen. He has been, at the same time, much favoured by a personal acquaintance with people who have given him a great deal of extra-official information, and by whose help, considering also his pre-eminent qualification for sifting information thus acquired, he has thrown a flood of light on a variety of subjects in connection with the Russian presence in Central Asia, which have hitherto been seen only as through a smoked glass. The work is much enhanced by the appendices, which are highly instructive in themselves, more especially those which are translations from the Russian by M. Grigrief, the greatest Russian Orientalist of the present day. Mr. Schuyler's work is, indeed, so compendious, that we can barely do more than point in a general way to its excellencies, noticing the admirable plates, which are chiefly from sketches by the well-known artist, Mr. Verestchagin, whose pictures were, two years ago, exhibited in London and at the Crystal Palace, and the two capital maps attached to the volumes.

On all the small moot points of Asiatic history, chronology or nomenclature, we find elucidation in numerous notes, which in some instances remind us of Klaproth's annotations of Timkofski's travels, by the aid of the Russian sinologist, Father Hyacinth; and as we are on the subject of notes, we feel almost inclined to ask Mr. Schuyler what it is that he particularly alludes to at page 296 of vol. ii., where he observes in reference to the rather inhuman burning and bombarding of the city of Andijan by General Trotky and Colonel (now Major-General) Skobelef,

* *Turkistan. Notes of a Journey in Russian Turkistan, Khokand, Bukhara, and Kuldja*, by Eugene Schuyler, Phil. Dr., Member of the American Geographical Society and of the Imperial Russian Geographical Society, &c. With three maps and numerous illustrations. In two volumes. Sampson Low, Marston, Searle and Rivington, 1876.

from October 12th to 16th, A.D. 1875—that "*the Russian officers were apparently unaware of the negotiations which had taken place at St. Petersburg to ensure the success of the Brussels Conference on the laws of war!*" Does he allude simply to "ravaging all the villages and farms" of a people not in arms, or to the employment of inhibited missiles, or what? The note of exclamation provokes our curiosity.

Is this another case of unprovoked Russian atrocity? We recommend attention to it in connection with the following bit of text at page 280, with its accompanying foot-note:

"It was resolved to prepare for an expedition against Kashgar (July 1875).

"NOTE.—It has been said that this expedition was in consequence of an arrangement made between General Kaufmann and Colonel Skobelef, by which to secure the good-will, and family, and court influence of the latter, who had been formerly opposed to General Kaufmann. For this purpose he was to be allowed to head a military expedition, and to receive the honours and advantages which accrued from it."

We lament the fact of Mr. Schuyler's disappointment on arriving too late to witness an execution, and we most particularly grieve that Mr. Schuyler does not state in his book, at page 114, vol. ii., that he endeavoured to persuade the Kush Begi of Bukhara not to ask the permission of the Amir to cut the throat of the man who had had an intention to attack the American Secretary with a stone in his hand, which, however, the man dropped.

Those who understand the satire will be highly amused by the following passage and quotation from the Russian satirist, Stchedrin, occurring at p. 207 of vol. i., in reference to Russia's civilising mission in Asia, to the *hunting up and driving of the natives* to the newly-established fairs by the Cossacks, and to the "complete discredit" to which commercial enterprise is being brought in Turkistan.

"The type to which he (the satirist) gives the name *Tashkentian*, is a civiliser . . . . an enlightener in general, in every place and in every way, and an enlightener, too, free from science but not confused by that; for science, in his opinion, was created not for the spread, but for the hindrance of enlightenment. A scientific man first demands alphabets, then syllables, the four rules of arithmetic, multiplication tables, &c. The Tashkentian sees in all that nothing but chicanery, and says *up and down* that to stop over similar trifles is to stumble and to waste golden time. One of his characters developes the advantages of the Russian *telega* (*cart*) as a means of civilising the Kirghiz. 'Don't interrupt me, *mon cher*, because I must express my idea fully. Thus, as I said before, the original mode of locomotion was on foot, but as man began to conquer nature and tame animals (*sic*), the means of locomotion became more complicated, and instead of confining himself to pedestrianism, man now begins to ride on four-footed animals. Thus arises a notion of property, which, on the basis of the rule *omnia mea mecum porto*, is placed on the same animal with the rider. This is already a step in advance, but, you will agree with me, a very limited step. (I nodded and winked a little, as though I wished to say, *Oh, comme je vous comprends, mon général!*) The property is insignificant, the means of transport is also insignificant; there is the key for explaining the existence of pastoral and nomadic notions. They wander about, move from one place to another, and never can settle in one place—*enfin, tout s'expliqué*. At last appears the *telega*, that uncomfortable and jolting equipage; but see what a revolution it produces! By its very uncomfortableness it compels its possessor to avoid superfluous movement, and in this way fixes him to the land. Thus fixed, he begins to get an idea of manure. Seeing the gradual accumulation of this fertilising material, the simple shepherd asks himself, "What is manure"? For the first time he begins to think about it, for the first time the idea comes to him that manure, like everything else in nature, does not exist without a purpose. He begins to appreciate manure, he sees in it *ses pénates et ses lares*. He constructs his dwelling near it,* and imperceptibly to himself he enters into the period of settled life. (*Oh, comme je vous comprends, comme je vous comprends, mon général!*) Do you understand? Man invents a *telega*, but this simple fact which almost every day passes unnoticed before our eyes, is quite sufficient for him to obtain elementary ideas of manure, and to leave for ever the habits of the nomads. But more than this, having a *telega*, he understands the basis of a sound civilisation. (*Oh, comme je vous comprends!*) Don't you see what a radical reform we at once make in the life of these unhappy vagabonds, risking nothing, even bringing nothing with us except a simple Russian *telega! Aussi, je leur en donnerai . . . . du tel̀egue! Ah!*'"

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ON THE PHYSICAL GEOGRAPHY OF THE GREAT INDIAN DESERT, WITH ESPECIAL REFERENCE TO THE FORMER EXISTENCE OF THE SEA IN THE INDUS VALLEY; and on the origin and mode of formation of the Sandhills. By *W. T. Blanford, F.R.S.* (*Journal of the Asiatic Society of Bengal*, xlv., Part II. 1876.)

THE best account that has hitherto appeared of the Great Indian Desert is contained in the interesting paper by Sir Bartle Frere in the *Journal of the Geographical Society* (xl., p. 181). Mr. Blanford describes, very fully, the physical character of the desert, with its botany and zoology, the distribution of the sandhills, and the evidence of recent marine action, including the discovery of a marine mollusc in the inland salt lakes or *dhandhs*. He then discusses the former existence of an inland sea covering in Ran of Kachh and eastern Sind, and also extending up the Leini Basin; but notices the want of evidence of marine denudation elsewhere in the desert.

His conclusions are that, within very recent geological times, the sea covered the Ran of Kachh, and the area now occupied by the Indus Valley, as well as a considerable tract in the Leini Basin; that the central part of the desert was not covered by the sea, but formed either an island or a promontory, and that the sand is mainly derived from the old sea coast, and its transport into the interior of the country is due to the south-west wind.

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OPINION ON THE EASTERN QUESTION. By *General Rastislaf Fadeéf*. Translated by *Mr. T. Michell, C.B.*, late Secretary H.B.M.'s Embassy at St. Petersburg.

THIS pamphlet was translated by Mr. Michell in 1871, with a foresight which showed two years before the repudiation by Russia of the Black Sea clause of the Treaty of Paris that he was even then aware of what was coming. This pamphlet is the embodiment of Russia's political aspirations. It argues that the Eastern question is to be solved on the south-western frontiers of Russia and in Vienna by war alone, and that Constantinople must be the capital of a *tribal* or *Slav* Union. Russian Panslavist views could not be more plainly and more cleverly expounded than they are in this pamphlet, and this second edition should be laid on the table in the Conference Chamber at Constantinople.

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COSMOS: di *Guido Cora*. No. IX., 1876.

THE *Cosmos* for September contains the first part of an article by Mr. F. V. Hayden, the well-known chief of

* At page 19 of vol. i. will be found an appropriate reference to this peculiar theory, where the author may be understood to mean that the nomad is nevertheless obliged to shift his quarters annually.

the United States Survey, on the Rocky Mountains. Captain Burton contributes two papers on Haidarabad and the diamond mines of India, and M. V. Largeau, the French explorer of the Sahara, gives an account of his journey from El Med to Bir Berr es Sof. The most interesting paper in the number is Signor Cora's regular *résumé* of explorations of New Guinea, and this we reviewed at some length in the Log-Book for our October number, p. 278.

Log Book.

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Sir George Nares.—Her Majesty, in recognition of his distinguished and valuable services in command of the Arctic Expedition, has created Captain Nares a Knight Commander of the Order of the Bath.

The Arctic Promotions.—Commander A. H. Markham was promoted to the rank of Captain on the 3rd of November, 1876. On the same day Lieutenants Aldrich, Beaumont, and Parr were promoted to the rank of Commanders, and Sub-Lieutenant Conybeare to that of Lieutenant. Dr. Ninnis became a Fleet Surgeon; Drs. Moss and Coppinger, Staff Surgeons; Mr. Mitchell, Paymaster; Mr. Cartmel and Mr. Wootton, Chief Engineers.

Discovery of more Relics of Barents.—This summer Mr. Gardner, in his steam-schooner-yacht 'Glow-worm,' made an interesting cruise in the Arctic Seas. Having secured the services of Captain Carlsen, the famous Norwegian ice-navigator, to accompany him, Mr. Gardner proceeded along the east coast of Novaya Zemlya, and reached the winter harbour of Barents, where he remained for three days. He succeeded in collecting a number of relics, including a manuscript which has not yet been deciphered. The 'Glow-worm' has arrived safely in England with her treasures; and Lieutenant Koolemans Beynen has recently taken them to the Hague, where they will be deposited with the other relics of Barents in the Naval Museum.

The Whaling Fleet.—The following is the take of the Dundee fleet this year:—

		Whales.	Tons of Oil.	Tons of Bone.
1	'Esquimaux' (Captain Yule)	5	55	3
2	'Erik' ... (Captain Walker)	11	160	9
3	'Camperdown' (Captain Gravill)	5	58	3
4	'Polynia' ... (Captain Kilgour)	7	80	4
5	'Narwhal' ... (Captain McLennan)	6	72	4
6	'Jan Mayen' (Captain Deuchars)	6	75	4
7	'Nova Zembla' (Captain Loffley)	2	25	1
8	'Arctic'... ... (Captain Adams)	6	90	5
9	'Intrepid' ... (Captain Soutar)	2	36	1¼
10	'Victor'... ... (Captain Nicoll)	5	50	2¼
11	'Active' ... (Captain Fairweather)	9	115	6
12	'Ravenscraig' (Captain Bannerman)	clean		
		64	816	43

Captain Walker made an interesting voyage in the 'Erik.' He took out several dozen of beer for the Arctic Expedition, which was received on the arrival of the ships at Godhavn, and duly appreciated. On the 19th of June Captain Walker sighted the cairn on the S.E. Cary Island, and then ran up to Littleton Island, where he landed at 3 p.m. of the 20th, and examined three cairns. At 8 p.m. he was at his farthest north, opposite to Baird Inlet, and he then ran south again, being off Jones Sound at noon on the 21st. As far as could be seen from the mast-head, there was open water in Smith Sound, in the direction of Cape Sabine, on the 20th of June, and no polar ice was visible in any direction. Captain Walker then ran up Lancaster Sound, and found fast ice stretching across from Leopold Island to Maxwell Bay. Proceeding down Prince Regent's Inlet, he was off Cape Kaye on the 24th of June, and back off Admiralty Inlet the next day. The rest of the season was passed in Baffin's Bay, including a cruise up Ponds' Inlet to Eclipse Sound, on the 14th of August, where 1140 salmon were caught.

A Danish Geographical Society.—We are glad to be able to announce that a Geographical Society has been founded at Copenhagen, and already numbers 380 members. The Crown Prince will probably be its first president. We feel sure that this Society will have a most successful career, under the lead of such men as Admiral Irminger, and the hydrographer Captain Rothe. The Transactions of our own Society are enriched by many valuable papers from the pens of eminent Danish geographers; and Denmark is famous alike for her daring and intrepid explorers, and for her scientific students of geography.

The Russian Expedition to the Pamir.—Owing to the difficulties experienced by the Kokand authorities, after the annexation of Ferghana by the Russians, in controlling the Kara Kirghiz to the south of the Khanate, who descend from the mountains only in the winter months, and in the summer retire to the Alai plateau, or the Kizyl-Su or Surkhab River, General Kaufmann ordered Major-General Skobelef to march a detachment into the heart of their summer pastures, and teach them that their retreats were not inaccessible to Russian troops.

The expedition was composed of three columns: the Utch-Kurgan, the Osh, and Gulsha columns, which were to proceed by separate routes and converge on the Alai. A military topographical party of eight persons accompanied the expedition. The astronomical and barometrical labours were entrusted to M. A. Bonsdorf, M. W. Oshonin was naturalist, and Captain Kostenko, geographer and statistician. These three were attached to the main column, which was to take the caravan-road from Ferghana to Kashghar, passing over the Terek-Davan. They reached Gulsha on the 30th of July last (N.S.), to find that the column had already marched out towards Kizyl-Kurgan. Gulsha is a quadrangular fort, to be garrisoned eventually with two companies of infantry and one sotnia of Cossacks, and to be fortified with four guns. Notwithstanding the wildness of the surrounding country and its isolation from other populated places, Gulsha is an important point, as the Kara-Kirghiz sow their wheat and barley around, and are thereby more amenable to control. The party ascended the valley of the Gulsha on the 31st August. Within eight versts of Kirzyl-Kurgan the detachment passed a place where, three months before, General Skobelef had a serious engagement with the Kara-Kirghiz under Abdulla Bek. This time, the Kirghiz had contented themselves with destroying the

bridge over the confluence of the Yangi and Gulsha, and this necessitated the construction of a fresh bridge, a job which, however, took only three hours.

In consequence of Abdulla Bek, with a party of Kirghiz, having occasioned fresh molestation to a messenger from the Russian force, General Skobelef sent out a flying detachment of 100 Cossacks with a draft of mounted rifles, under Colonel Prince Witgenstein, towards the Archat Pass (10,300 feet), and then followed in the same direction himself. From the top of the pass a magnificent panorama opens to the view. In the foreground is the Alai plateau, beyond it rises the Trans-Alai mountain range, while the valley, or rather the high table-land, of the Kizyl-Su river stretches out before the spectator. This river winds in a broad bed about one verst across, and is divided into several arms. The water is red from the clay in its bed, but it has a good taste and is potable. On the 30th July, the detachment marched in a south-easterly direction to the base of the Trans-Alai range, where Prince Witgenstein's flying column was already occupying a position. The intervening country is an undulating valley perceptibly raised towards the Trans-Alai range. The breadth of the Alai plain, in the section traversed, is 11½ miles. After capturing the mother and wives of Abdulla Bek, besides a large flock of sheep and many horses, Prince Witgenstein was despatched to the Kizyl-Yart defile after Abdulla Bek.

On the 31st July the elders of the tribes wandering on the Alai came with proffers of submission to the Russian authorities. A small fine was imposed, and notice given that next year some hundreds of labourers would be required to make a road from Gulsha to Sofi-Kurgan. The commanding officer paid a visit to the mother of Abdulla Bek, a clever and energetic woman, possessing much influence over her people, and was successful in persuading her to exert her authority to induce the Kara Kirghiz to remain tranquil.

In consequence of intelligence received subsequently that Abdulla Bek was supposed to have fled towards Kashghar, a mounted division of rifles was despatched to Prince Witgenstein, who was on the Kara-Kul Lake, and Captain Kostenko was attached thereto. A 7 versts' ride over the Alai plateau brought the troop to the Kizyl-Yart defile in the Trans-Alai mountains, a defile which, though thickly strewn with boulders, may be easily made available for wheeled carriages by removing the stones. From the summit of the pass a view is obtained of the Pamir generally, and in particular of the Pamir *Hargashi* (of hares), in the southern portion of which lies the Kara-Kul Lake. A mass of bare snow-capped mountains stretching in various directions, and intersected by more or less wide valleys and gorges, opens to the view.

On the 3rd August Captain Kostenko undertook an excursion to the lake. A considerable portion of the lake is occupied by islands and necks of land, one having the appearance of a high longitudinal ridge intersecting the lake from north and south. The narrow strips of low land projecting into the lake were in parts covered with verdure; from the quantity of feathers about, large flights of birds, such as wild geese and ducks, as well as gulls, evidently alight here.

During the 15th, 16th, and 17th of August, Colonel Lebedef, of the corps of Topographers, and Captain Kostenko, made an exploration of the lake on three sides, and the Colonel made a plan of it in its entirety. The length proved to be 22 versts and the breadth 17 versts. Contrary to all hitherto received opinions, it turned out to have no outlet, but, on the other hand, to receive several mountain-streams. There are fish in it, on which a great number of water-fowl appear to subsist. Captain Kostenko was informed by natives that once a week—on Fridays—the lake rises, and this appeared to be corroborated by his own observations.

Correspondence.

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FORMER PHYSICAL ASPECTS OF THE CASPIAN.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—If your space will allow, I would beg to make a few remarks regarding Dr. Woiekof's criticism of the papers on "Former Physical Aspects of the Caspian," which I submitted to your readers in January and February last.

In his letter, published in the *Geographical Magazine* for August, Dr. Woiekof writes as follows: "Major Wood says, that the evidence he has given on the former low level of the Caspian waters would be of little value, if he could not *prove** that in comparatively recent times, even in the fifth century of our era, the Volga, or a large part of it, flowed into the Sea of Azov." What I actually did say was something very different *ex. gr.*: that "the indications of the low level anciently possessed by the Caspian Sea might not, perhaps, be considered of great practical significance, if *some evidence* did not also exist of a former flow of at least a portion of the Volga waters into the *Palus Mœotis*." In another place I said, "The passage of this river to a former outlet in the Sea of Azov is *strongly suggested*;" and a reperusal of the papers fails to show me that I dogmatised on a subject which must necessarily be a very obscure one, but which, perhaps, for that very reason possesses additional interest.

Having submitted evidence bearing on the above point, I said that, "Some Russian geographers are inclined to believe, *I have been told*, in a former passage of the Volga waters through this gap at Simbirsk;" and this statement Dr. Woiekof specially falls foul of. He says, if there was a gap in the ridge along the Volga's right bank, at Simbirsk, "It would not have enabled the river to flow southward." As elsewhere in his letter he grants that some of the present stream of the Volga might have found its way formerly into the Sea of Azov from another direction, I shall accept his correction with thanks; but with this remark, that the correction would have been unnecessary had not Dr. Woiekof himself informed me, that "*Some Russian geographers are inclined to believe in a former passage of the Volga waters, through the gap at Simbirsk!*"

Dr. Woiekof thinks, moreover, that my hypothesis contradicts itself; for, as I admit no recent elevations or depressions of ground, the surplus waters from the *Palus Mœotis*, would have filled up the Caspian basin by the line of the Manytch. What I submitted was, that an overflow was probably taking place, or had just ceased taking place, from the Sea of Azov, by the channel of the Manytch, in the fifth century. Such an

* The italics are mine.

overflow would have been an intermittent one, and have occurred only when the rivers feeding the Sea of Azov were in flood, *i.e.*, when their discharges were at least twice and a-half greater than their low level ones. At such a time, consequently, the Strait of Yenikale might have been insufficiently large to pass off the surplus waters, and the elevated Azov level might then have topped the highest point of the Manytch, and thus flowing into the northern basin of the Caspian, have formed the marsh which was spoken of by the Byzantine historian whom Stritter quoted. But it by no means follows that such an intermittent overflow would be sufficient to fill the Caspian basin, as Dr. Woiekof supposes.

Dr. Woiekof further says I have forgotten one thing, which is, that a much greater flow of water could take place "through the Bosphorus even without any enlargement of the Strait." So far from forgetting it, I submitted that in old times a much greater quantity of water entered the Sea of Azov (most probably from the river now called the Volga) than at present flows into the sea; and that this greater body of water passing into the Euxine, through the Strait of Yenikale, had gradually enlarged this strait. From the Black Sea the water passed out through the Bosphorus, whose dimensions I distinctly stated were superfluous for the issuing stream of these days.

On this point also I submitted some figures, but Dr. Woiekof says M. Elisée Reclus, from whom I quoted, cannot be depended upon, and that his information is a mere "guess." On the whole, I prefer to accept the "guess" of the accomplished French geographer, and this more especially since it is grounded on statements of a well-known Russian geographer; and since Dr. Woiekof has none other to afford me, not even as much as that which he gave me a year ago, regarding the gap at Simbirsk, a gap that he now says has no existence! I did not, when I quoted from M. Elisée Reclus, "warn" my readers against the arguments he adduced in the article from *Le Globe de Genève*, to which I gave the reference. The paper was there for readers to examine and judge of for themselves, and the "warning" that Dr. Woiekof says I should have given would have been an impertinence on my part. I quoted, by the way, from Colonel Veniukof and M. P. Von Tchihatchef, as well as from M. Reclus; but the former gentlemen being Russians, their information, I suppose, in Dr. Woiekof's estimation, is above suspicion. I will add, that I have no doubt whatever of this being so, and that neither they nor M. Reclus would make any statement in bad faith, or without having sufficient grounds for their belief.

Lastly, Dr. Woiekof thinks Mr. Spalding's scheme of uniting the Black and Caspian Seas to be a "bad joke." Like many "bad jokes," I would remark, it is a tolerably ancient one, since Peter the Great himself had something to do with it. However, as Mr. Spalding's scheme was published first in England, about April last, I fail to see how anything I said in papers which were printed in the *Geographical Magazine* for January and February can show, as Dr. Woiekof says, my "robust faith" in a project that I had not then heard of.

Yours faithfully,

HERBERT WOOD.

WALTAIR, INDIA, *October 6th*, 1876.

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SERVIA.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—In the October number of the *Geographical Magazine*, it is stated that at the Peace of Bucharest in 1812, Servia "was to some extent neglected by the Russian Government. A complete amnesty was to be granted to the Servians. . . . . The cruel part of this arrangement was that the Russians must have known by long experience that the Turks are utterly faithless." Then follows an account of the horrible tortures to which the Servians were subjected by the Turks. The following passage from the *Life and Times of Alexander I. of Russia*, by C. Joyneville, 1875, shows that on this occasion our selfish policy as regards Eastern Europe intervened to exact the restoration of the Turkish suzerainty. Napoleon, backed by the whole continent, had just entered Russia with 600,000 men, and Alexander I. could not afford to turn England also into an enemy; but he had given orders to his plenipotentiary that if Turkey declined to accept his terms (which while he relinquished Moldavia and Wallachia, incorporated for two years in his empire, required that they should only be tributary to Turkey, but never occupied by her troops, and that Servia, his brave ally, should be entirely separated from Turkey, and protected for a time by a Russian garrison), the Russian army on the Danube should force a passage into Dalmatia, raising the Christian population *en route*, and form a junction with the Russian fleet at Corfu, for a descent upon Italy in the absence of its king, Murat, with the French in Russia. "England's fear of a rival on the Mediterranean opposed this project. . . . . Wilson, armed with the authority of his government, strongly protested, and induced Tchichagof also to withdraw from Servia. . . . . It was understood that the British influence was strong enough to preserve Servia from the barbarity of her suzerain. . . . . While England was securing colonies in all parts of the world, Alexander was reminded by the British Envoy, that 'the great object of contest was the destruction of Bonaparte's iron sceptre, that all other objects, however desirable, which may retard the principal success, are now of minor and prejudicial character;' and the letter ended with something like a threat as to the rapid improvements in Turkey which would soon render her *truly formidable*. . . . . Russia had constituted herself the protector of the Christian population in Turkey, to obtain for them at least the free exercise of their religion; while England regarded them as slaves with no judicial rights, and doomed to be treated for ever like dogs or giaours, as they were commonly termed by their tyrants. . . . So Bosnia endured persecution till she became Muhammadan, and Servia was overrun and laid waste by a Turkish army to satisfy British interest." And again, during the Congress of Vienna, Wellington wrote "the Emperor of Russia is excessively anxious that the assembled Powers should concur in immediately urging the Government of the Porte to act with more moderation towards the Servians, which, contrary to the stipulations of the Treaty of Bucharest, his majesty alleges is treating that people with great severity. I have urged Count Ragoumevski, who spoke to me upon this subject, to delay the mention of it to the other Powers till the period at which the Powers should guarantee the dominions of the Porte."

I am, &c.,

A STUDENT OF HISTORY.

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THE SISTAN MISSION.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—I should much regret to have misrepresented the achievements of the Sistan Mission, as Sir F. Goldsmid seems to imply, but, in vindication of the statement objected to by him (*antea*, p. 312), need only refer to the passage in his own work (vol. i., pp. 311-312), of which the incriminated paragraph is little more than a paraphrase.

Yours, &c.,

YOUR REVIEWER.

Proceedings of Geographical Societies.

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THE ROYAL GEOGRAPHICAL SOCIETY.

Meeting of November 13th, 1876.

THE PRESIDENT'S ADDRESS.

THE forty-seventh session of this Society was opened with an inaugural address from the President, Sir RUTHERFORD ALCOCK, K.C.B. He informed the meeting that during the last session the number of Fellows had increased from 3,000 to 3,199, and consequently a corresponding increase of income, which might be taken as evidence of popular interest in their work, as well as the repute in which the Society was held. Referring to the return of the Arctic Expedition, he expressed an opinion that it had proved the impracticability of reaching the Pole by the Smith Sound route, and dispelled the theory of an open Polar Sea. They might rejoice that the British flag had been carried nearer the North Pole than any other, and had been planted in the most desolate region yet discovered on the globe—only 400 miles from the Pole. Not indeed for the puerile vanity of being a few miles nearer the earth's summit, but because to be the first in such a struggle proved the possession of some of the best and highest qualities of our race—dauntless courage, physical powers of endurance of a rare order, sustained by unfailing energy and unconquerable will. It is only men of such a type, the best and highest we know, who can win their laurels in endeavours to reach the Pole. It may be, as suggested the other day, that the "North Pole is no more interesting, *per se*, than any other part of the Arctic regions, and is merely that spot on the earth where the sun's altitude is equal to its declination"—but this, which may serve as a scientific formula, gives no hold or place for the spirit of the discoverers in all ages, to whom the unknown presents an irresistible attraction—nor the still larger class of men from which heroes spring, who need no other lure than the certainty of meeting danger and difficulty in their path, and the glory that attends success in triumphing over them. It is from the ranks of these chosen pioneers of our race in the regions of the unknown that Arctic Expeditions are recruited, and by them alone the noblest triumphs for science and civilisation are won in the fields of discovery. He would not go further into the history of the Expedition, and its dangers or difficulties, because he was enabled to announce that arrangements had been made by the Council of the Society for an evening meeting on December 12th, at St. James's Hall, under the presidency of His Royal Highness the Prince of Wales.

From the Polar Regions Sir Rutherford turned to the Torrid Zone, touching first upon the journey of Cameron, the value of whose researches, following upon those of Livingstone, had shown that legitimate trade by practicable routes could be established, settlements made, and the slave-trade suppressed. To Mr. Stanley it had been reserved to prove that the Victoria Nyanza is not a series of lakes, and the valuable observations he had made contributed greatly towards solving the geography of the lake region. Attention was next called to the efforts of the various missionary bodies to establish mission-stations in Africa. The Church Missionary Society, whose aim is to establish a mission at Karagué, had, through its pioneers, explored the Rivers Wami and Kingani, with a view to ascertaining how far they might help, by their navigation, in facilitating access to the interior; but both rivers had been proved nearly worthless for the purpose required. The preliminary explorations of the London Missionary Society had been very satisfactory. Mr. Roger Price had succeeded in proving, by personal survey and actual trial, the practicability of a bullock-waggon route from the coast as far as Ugogo, the point which the Society had chosen as a station for its operations being Ujiji. The Established and the United Presbyterian branches of the Scottish Church are severally engaged in similar work, and have established a memorial station, Livingstonia, on the Lake Nyassa, and launched a steamer upon its waters, under the auspices of Mr. E. D. Young.

Sir Rutherford next spoke of Colonel Gordon's work in the direction of the equatorial lakes, and the explorations of the Albert Nyanza, by M. Gessi, and Mr. Stanley, who, on visiting the southern end, found that it extended further south than suspected by M. Gessi. M. Piaggia had been re-examining the new lake, first seen by Colonel Long in the course of the Nile, between Foweira and the Victoria Nyanza, and his information fully confirmed Colonel Long's account, the basin being 50 miles in length, with a second outlet on the north in the direction of the Lobat River.

The PRESIDENT next touched upon the Congress which assembled, during the recess, at Brussels, at the invitation of the King of the Belgians, and which resulted in the establishment of an "International Commission of Exploration and Civilisation of Central Africa, to be supplemented by National Committees" to be formed in each country. The King had graciously accepted the first Presidentship of the "International Commission," and it only remained for the National Committees to be effectually constituted to promote the objects contemplated. That for Belgium had already been created, with H.R.H. the Count of Flanders at its head, and several sovereigns and princes had expressed their sympathy, and consented to be enrolled as honorary members of the "International Commission." H.R.H. the Prince of Wales had consented to be the Patron and President of the National Committee now forming in this country. The President further mentioned that, at a meeting at Glasgow, resolutions were passed in favour of raising funds and memorialising Her Majesty's Government to aid in the surveys required to ascertain the practicability of the formation of a road from the northern end of Lake Nyassa to the south end of Lake Tanganyika, and also from the northern end of that lake to the coast at a point north of Cape Delgado. After anticipating some of the results that might be expected within a short period, were public co-operation secured, Sir Rutherford briefly referred to the proceedings of the Geographical Section of the British Association, calling particular attention to those papers on the voyage of the 'Challenger.' He then went on to speak of the recent Oriental Congress at St. Petersburg and of Colonel Sosnofsky's expedition to Western China for the purpose of exploring a new trade route. The road from Lan-chu to Zaisan was found to be nearly 1400 miles shorter than that by Kiachta, and perfectly fit for wheeled vehicles, and passes through a populous, fertile, and well-watered plain, and only for three days traversing a sterile district. The importance of a route which will convey Russian goods from Novgorod and Orenberg by way of Semipalatinsk to the central provinces of China through Mongolia, and thence to the far east on the banks of the Amur, was quite apparent.

In conclusion the President announced that in order to extend in a more strictly scientific direction the range of geographical work, the Society had set aside £500 per annum, and it had been arranged that not less than three lectures, by persons of recognised high attainments, should be delivered each session. General Strachey had consented to give the first of the lectures on the general subject of "Geography in its Scientific Aspect;" Dr. Carpenter would deliver the second, on the "Physical Geography of the Ocean;" and Mr. Wallace the third on "The Comparative Antiquity of Continents as indicated by the distribution of Living and Extinct Animals."

A paper was then read by Sir DOUGLAS FORSYTH, K.C.S.I.,

"ON THE BURIED CITIES OF THE GOBI DESERT."

Sir Douglas Forsyth commenced his paper on the "Buried Cities in the Shifting Sands of the Great Desert of Gobi," by a reference to the fact that Mr. Johnson, during his journey to Khotan, had brought an account of his visit to an ancient city not far from Kiria and about five marches from Khotan, which had been buried in the sand for centuries, and from which gold and silver ornaments and even bricks of tea were dug out. On the occasion of Sir Douglas' second journey to Kashghar, in 1873, he collected all the available authorities on the subject, Marco Polo's narrative ranking among the most important of these.

Khotan is very briefly mentioned by Marco. It is supposed by some to have been the limit of Darius's conquest, and Sir Douglas has several Greek coins which were found in the ruins of the city near Kiria. In early days it was inhabited by political exiles from India, and the Hindu religion flourished there. Sir Douglas took occasion here to mention that the assertion made that the Himalayas form an impenetrable barrier, and that the only army which ever crossed from the Indian side never returned, was erroneous, Mirza Haidar having, in his Tariki Rashidi given an account of an expedition under Sultan Saïd from the Yarkand side.

Marco Polo's Pein is, in Sir Douglas' opinion, identical with Kiria, but the present state of morality as enforced by the ruler of Kashghar is very strict, and a great contrast to what it was in Marco's days. Charchan is a place of about 500 houses; it is held by a governor under the Amir, and is situated on the banks of two rivers which unite on the plain and flow to Lake Lop. The position of Charchan has not been fixed, but it is probably equidistant from Kiria and Kurla (4 marches), and about 384 or 400 miles from Khotan. The province is described by Marco Polo as sandy, with bad and bitter water, and it is now said to contain oases where are to be found wandering tribes of Sokpos or Kalmaks with their herds.

Prejevalsky says of the sands of Kuzupchi, that the Mongols tell marvellous stories concerning cries and groans heard in the desert, and that the sands shifted by the wind expose silver dishes and other objects, which, however, are not removed owing to the superstition of the Mongols. It is somewhat remarkable that though Marco Polo travelled from Khotan to Lake Lop, he nowhere mentions the report of buried cities, while Mirza Haidar, two centuries after, alludes to them.

Regarding Katak, Mirza Haidar gives an account of the destruction of the city which had been foreseen in the gradual advance of the sand, and how it was eventually buried in a sandstorm. A similar story is told by the Chinese of a town near Pima, which was destroyed in the sixth century A.D.

From inquiries made by Dr. Bellew and others, it appears that the large town of Lop, mentioned by Marco Polo, exists no longer, but that there are numbers of encampments on the banks of the marshy lakes and their connecting channels. They are inhabited by families who emigrated there about 160 years ago, and are looked upon with contempt by true believers as only half Mussulmans. The aborigines are described as very wild people—black men with long matted hair, who shun society and wear clothes made of the bark or fibre of a tree which grows plentifully all over the sandy wastes bordering on the marshes of Lop.

According to the statement of a Kirghiz of Kakshal, who had resided for three years at Lop itself, there are two countries called Kok Nor, one five days' journey north of Urumchi, the other beyond Lop, five days south of Kucha and continuous with Charchan on the east of Khotan, and in it are the ruins of several ancient cities. The principal of these is called Kok Nor, and is in the desert to the east of the Katak ruins, and three days' journey from Lop, in a S.W. direction along the Khotan River. The walls are seen rising above the reeds, and there are many venomous snakes and insects within the reeds. The Kirghiz remarked that people who go among the ruins almost always die, because they cannot resist the temptation to steal the gold and precious things there. He also stated that in the centre of the ruins is a temple with a figure inside, with precious stones and gold ingots ranged on shelves around.

While Sir Douglas was at Yungi Hissar, he and Dr. Bellew made an excursion to the north-east, and discovered the ruins of a buried fort, and within it coins and fragments of glass, a manufacture apparently unknown at the present day in Kashghar. Northward and to the north-west sand-dunes are of frequent occurrence, these being formed by the persistent action of the north and north-west winds which here blow over the plain during the spring months. The shepherds state that the buildings overwhelmed by these dunes occasionally reappear, and are again buried beneath the sand. In some instances the discovery of skeletons and desiccated bodies in the ruins shows that the inhabitants must have been buried alive.

Sir Douglas dispatched a Pundit in the direction of Khotan, and he brought back from the buried city near Kiria an image of Buddha, and a figure of Hunooman, the monkey-god. Another man brought back some gold finger-rings and nose-rings, such as are worn by Hindu women, and some coins; an iron one, apparently of Hermæus, the last Greek king of Bactria in the first century, and several gold coins of the reign of Constans II., Theodosius, and others. These buried cities are many marches east of Khotan, but discoveries have recently been made close to Ilchi, and a gold vase of about 16 lbs weight, said to be a neck ornament of Afrasiab, father-in-law of Cambyses, was unearthed.

Close to Kuchar there is said to be a ruined city called Tukht-i-Turan, and, about 60 miles to the north, a large idol cut out of the rock, from 40 to 50 feet high, with 10 heads and 70 hands. Not far from Kashghar is the Kohna Shahr, or old city, whose walls, though built of sun-dried bricks, is still standing. This was destroyed many centuries ago.

The question, Whence does all this sand come? is one of much interest, as the sand-hills move invariably from the north-west and the great Gobi desert lies eastward. The explanation of this, Sir Douglas considers, lies in the fact that the sand is brought from the Gobi by a circular current of air—he having observed something of the same sort, on a small scale, crossing from the Chang-chen-mo to the head of the Karakash valley.

Sir Douglas concluded his paper with an explanation of his motives for not insisting on perfect liberty of action to the members of the Mission during their stay in Kashgharia. Asiatics, he observed, are habitually suspicious, and are utterly unable to comprehend the object of scientific expeditions. Though very anxious to visit Lake Lop and Khotan, he was compelled to desist from these projects for fear of causing a breach in the very friendship he was endeavouring to cement.

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EGYPTIAN GEOGRAPHICAL SOCIETY.

November 3rd, 1876.—General STONE in the chair. His Highness Mohamed Tawfik Pasha, Crown Prince of Egypt, had promised to take the chair, but was unable to attend.

The MARQUIS DE COMPIEGNE reported on the results of the Brussels Conference, and Signor CARLO PIAGGIA then read the following paper on his explorations in Africa:—

"I have returned now for the third time from the Upper Nile, and in the course of this meeting I can merely give a sketch of my various journeys. My first journey was undertaken in 1856, and after three efforts to penetrate up the White Nile and the Sobat, I was forced to return. But in 1863-65 I succeeded in my

plans, and penetrated far into the interior, having been the first to reach the country of the Niam Niam. I stayed twenty-six months amongst these cannibals, and had thus an opportunity to make myself thoroughly acquainted with their manners and customs. They are a very peculiar people; and manifold experience has convinced me that man, in a state of nature, is always gentle and good-natured at the bottom, and that, by treating him kindly and indulgently, advantage is always to be derived from intercourse with him. I therefore am sorry that certain persons should deem it advantageous to apply brute force in endeavouring to realise their objects, thus estranging the savages with whom they have to deal. I started upon my last journey in 1871, and up to 1875 I explored many parts of Abyssinia, from the Tigre as far as Gojam. I spent over a year on the banks of Lake Tsana, working as a gunsmith and making collections. I then descended to the lowlands to the north of Abyssinia, and from Matamma went to Khartum. I am well acquainted with these countries, as well as with the tribes inhabiting them, and their productions, and there can be no doubt that they have been neglected hitherto by the Egyptian Government as well as by merchants, though they might become the sources of inexhaustible wealth. In April of last year I was again at Khartum, anxious again to penetrate Central Africa. The White Nile was closed at that time against travellers and merchants, but Gordon Pasha not only permitted me to ascend the river, but even offered that I should make an expedition up the Sobat, placing boats and soldiers at my disposal for that purpose. I was required, however, first to proceed to Dufle, to receive further instructions. I ascended the White Nile for the sixth time, and reached Dufle on the 28th of February. Instead of being sent back to the Sobat, I was ordered to the south. Signor Romolo Gessi was about to start with two barges laden with arms and munitions of war, intended for the post of Magungo on the Mwutan. I was ordered to join this expedition, and then to ascend the Somerset river from Magungo and to follow it as far as the Ukerewe. At that time the course of the river above Dufle was altogether unknown, and we rejoiced at an opportunity of making fresh discoveries. The difficulties of navigation proved very great, and we spent fully eight days upon the journey, suffering much from hunger and overwork. A little episode will bear out what I said above respecting savages. The soldiers attached to Gessi's expedition complained about hunger and hard work, but the savages, who followed our movements on the banks of the river, and were frightened at seeing so many armed men, would not permit us to land. In spite of their threatening gestures I effected a landing, accompanied only by the servant who had accompanied me from Khartum, and carrying my gun. I approached a group of natives, and, shouting, I asked for some food. At first they proved reluctant, but when they saw me pet their children and distribute beads amongst them, they became friendly, and supplied us with all they had. At length we met with a chief whom Baker must have known, and who took charge of the stores brought by Gessi. This chief called himself Zaldemek, and was attended by 140 men.

"On the 13th April I was able to start with an escort of eight men. I had a canoe, propelled by two rowers and guided by a coxswain. Gessi had left the day before to continue the exploration of the Mwutan. I followed the river upwards for 35 miles, to the foot of the Murchison Falls. Thence, as far as the post of Foveira, a distance of 63 miles, the river forms an almost continuous series of cataracts. I therefore took my boat into three pieces, and continued my journey on foot. For eight days I made my way through forests and over deep ravines. Burnt villages were seen by me along the road. At Foveira I again met Gordon Pasha, and was able to compensate myself for the fatigues through which I had passed. I put my fragile boat together, and on the 30th April left for the south. During eight days we sailed up the river, several times narrowly escaping an upset by hippopotami, who abound in these waters. On the 8th May I reached Moroli, a military post maintained by Gordon Pasha, where I was hospitably received. At my request I was furnished with four canoes, fifteen rowers, twenty natives and two interpreters, who were to accompany me to Mtesa's residence. Our departure was delayed on account of dense masses of papyrus and of floating islands, and it was only on the 24th May that we succeeded in forcing a passage through these vegetable accumulations. We thus reached the Kapekki Lake, which I explored in all directions during six days, collecting minerals, plants, and conchyeia along its shores. But heavy rain—which fell without interruption, and prevented our landing—and the miasmatic air produced fever, and I was reluctantly forced to return, in order to save the lives of my companions. We reached Moroli without meeting with a single accident. On the 9th June I was again at Dufle. The interpreters of King Mtesa, whom I met in the course of my journey, communicated to me several interesting particulars respecting their country. I learned from them that the American traveller, Stanley, of whom they spoke with affection, had left the Ukerewe Lake on the 24th of May, in a south-westerly direction, in order to search for a copper-mine of which he had heard."

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BERLIN GEOGRAPHICAL SOCIETY.

October 7th, 1876.—Baron RICHTHOFEN in the chair. The President announced the death of two of the leading members of the Society. Dr. Meinicke, well-known through his works on Australasia and the Pacific, died at Dresden, at a ripe old age. Dr. Ule, the editor of *Nature*, was killed at Halle while in the execution of his duty as captain of the volunteer fire brigade. The President then gave an account of the proceedings of the Geographical Conference held at Brussels. The King of the Belgians, whom they had nominated one of their honorary members, was most anxious to promote civilisation in Central Africa. The stations to be established would resemble those already founded by Scotch missionaries, who knew very well that the bible could not be introduced from the beginning. They sought first of all to attach the negro to his home, taught him agriculture and trades, and thus obtained an ascendancy which enabled them to introduce the subject of religion with success.

Dr. BASTIAN gave an account of his travels in South and North America. He had visited Chili, Ecuador, Peru, Columbia, Guatemala, and returned to Europe by way of San Francisco.

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